HIB-GA 40
February 1959
Volume 7 : 40

E K I S T I C S

HOUSING & PLANNING ABSTRACTS

Published for private circulation by
DOXIADIS ASSOCIATES
Consulting Engineers
Lykavittou Strat. Syndesmou
ATHENS, GREECE. Tel: 616.111

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Dymaxion map on cover by Buckminster Fuller, Patent 2393676

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EDITORIAL

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Climate

For the most part this issue of Ekistics is concerned with the adaptations of man's habitation to adverse climatic conditions. It has been proven beyond reasonable doubt that the same "comfort zone" suits all mankind, no matter what their race or habits of life may be (see Psychological aspects of life in a warm climate by S. Biesheuvel p. 171). It is partly for this reason that close comparisons can be drawn between planning for life near the equator and in the artic: in both cases "comfort zones" must be artificially created by man, by isolating himself from "natural" climatic conditions. It is even possible that P. Whiteley's penetrating article on "Roof painting problems in tropical climates" may be equally applicable to the extreme north!

In the housing section Koren'kov illustrates how mass housing designs can be adapted to meet the differing conditions in the hot dry and hot humid areas of the Southern USSR: and the all-importance of orientation in relation to wind direction. Climatic conditions are also of over-riding importance in three contrasted designs for new towns in the Canadian far north. A critical description of Elliot Lake (sometimes called "the best planned mining town") brings out the weaknesses of transplanting to the "frozen north" the values of a prosperous middle-class community living in a temperate climate: the emphasis on home-ownership and the single-family-house standing upon its own half-acre lot. This project can be directly compared with the new Finnish "garden city" of Tapiola with its emphasis on walk-up apartments and a form of co-operative ownership. A revolutionary design for new developments in the far north comes, interestingly enough, from a group of architects employed in Canada's Department of Public Works - an area which in many countries is renowned for its backward rather than its forward thinking.

The Human Touch

Several articles point up the lack of effectiveness of a purely scientific approach when dealing with a subject so close to human life as housing. Koren'kov's discussion of the weaknesses of centrally produced mass housing plans for the southern USSR has already been mentioned, also Biesheuvel's account of man's reactions to climatic change.

Two other articles point up factors which are all-important, but often forgotten in official development schemes. Samuel Kaplan describes the successful building of social services in a development a few miles from Mexico city and G.A. Atkinson gives an account of shack or shanty housing in Africa, suggesting that a new view be taken of these "illegal" dwellings and of the tolerable densities at which single-storey dwellings can be built.

This last article comes very near to the theme on which Dr. Doxiadis opened a course of lectures at the Massachusetts Institute of Technology in 1957. Here he makes a plea for a revised attitude towards "standards" especially those taught to students in schools of architecture and planning.

The Cities of Iraq

This leads directly to the last of series of abstracted reports on the future of several cities of Iraq prepared by Doxiadis Associates. The first of these dealt with a plan for Kerbala, where the major problem was the lack of accommodation for pilgrims in an ancient and crowded city: the second a plan for the oil city of Kirkuk: the third a twin plan for the holy cities of Nejev and Kufa and now a plan for Amara, whose chief problem is one of deplorable housing conditions. All these reports have deliberately followed almost indentical methods of analysis and presentation but each has shown a way of tackling the major problems of each city honestly and effectively within the economic means available.

HHFA

It is possible that some readers of Ekistics may be interested to know that, under a program sponsored by ICA (the International Cooperation Administration of the United States) and planned by the US Housing and Home Finance Agency's International Housing Service, the following people are now touring the United States. Santiago Lonza, of Chili's Housing Agency, and Chong Hoon Song of the Korean Reconstruction Bank are studying housing finance and mortgage insurance and savings and loan associations. Four sectional chiefs of Thailand's Ministry of the Interior are studying city and regional planning, public works, highways, construction methods and building codes.

Ekistics is compiled by Yvette and Lawrence Mann under the direction of Prof. J. Tyrwhitt. Enquiries or comments should be addressed to 7 Sumner Road, Cambridge, Massachusetts, USA.

NOTE: The lettering at the top of each page refers to Doxiadis Associates system of classification. The figures below each title refer to the Universal Decimal Classification.

Architecture, Planning and Ekistics

C.A. Doxiadis

Abstract of the first of a series of lectures given at the Massachusetts Institute of Technology, Spring 1957

1. For many years I was ever more and more concerned about my personal failure. Where others saw success, as measured by promotions, I only saw myself as someone kicked upstairs. It was strange: I had continually the sensation of being someone who had not done his duty. All the time, while I was struggling with problems of architecture and planning, I had the feeling that situations were getting worse instead of better and I felt smaller and smaller in relation to the problems I was called upon to meet.

2. Then a day came when I began to realize that I was after all carrying on a battle with honor even though perhaps it was a losing battle. It was then that I sat down to try to evaluate these problems which always seemed greater than the efforts being made to alleviate them. I began to recognize that people all over the word were living under worsening conditions: whether it was the millions living outside Calcutta in the mud and rain with no shelter over their heads or the millions living in New York waiting daily two hours to reach their destinations. Whether one looked to East or West, to underdeveloped or highly developed countries, the situation was the same: living conditions were getting worse.

3. Something was clearly wrong. I tried to understand what this was. From the economic point of view, from the social point of view, from the political point of view, from the technical point of view, from the aesthetic point of view, we are all doing our utmost: every single one of us. Every professional man is dedicated to the problem of the better planning and better building of our cities and structures, but we continue to fight a losing battle.

4. The human being is socially displaced in our huge metropolitan cities, knowing few neighbours and without social responsibility for his environment. We have created huge new social agglommerations around industrial business centers which are under no human control: over which even official administrative control is extremely weak. In this field the battle for a better life is being lost. We are also losing the battle in the technical field, as there are still many millions of people who lack even the simplest, most elementary essentials of community living: a pure water supply, drainage and sewerage. Finally we are losing the battle in the aesthetic field, in spite of colossal efforts being made all over the world by individual architects, great or small. This is because the total number of buildings designed by them is infinitesimal compared to the multitudes of buildings put up with no expert assistance whatsoever.

5. I may be told I am a pessimist; that there are areas along the Pacific Coast of the USA, around New York, around Boston, around Chicago, London, Paris, Rome, where living conditions are very good and - even though this might be debatable - I would be prepared to agree. But what are these areas compared to the two and a half billion people living in the world? One day I calculated that all the efforts of technically trained people - architects, civil enginners and planners - touched no more than 2% of the population of the

world. This 2% is the maximum and, even if we assume that all this technical aid is everything one could wish, 98% of the world's population remain.

6. Those who are in charge of the architecture and planning of our living environment are losing the battle. There are of course reasons for this. Take the problem of housing. The whole question of housing is undergoing tremendous change. The continuing increase in the world's population means an increase in density of living. More and more nations are approaching the conditions of Holland among the most highly developed countries, and East Bengal among the underdeveloped, where there is more than one person for every acre of land in the country. Then new means of transportation and communication are causing the earth to shrink in terms of time and space. People are coming closer together in many ways. Also the new technology brings man and machine in ever closer juxtaposition. Whether we want it or not, we are now in an era when we are obliged to turn our attention to social classes and to distant countries which seemed for long centuries to have been forgotten by God. These people, these countries, are now on our doorstep - at the most at a distance of a few hours away.

7. Then comes another problem, and here I feel ashamed. A recent report on European economy has said that the most backward branch of economic development is the building industry - and the situation is no different in the USA. Whilst other industries have been going ahead and increasing their productivity at an ever accelerated tempo, the building industry (taken as a whole) shows the slowest rate and the lowest increase of any productivity at all.

8. At this moment, when architects and planners are called upon to face greater problems than ever before, problems far too large for us, we proceed to complicate things by splitting decisions among a host of unconnected experts. For instance it is the economists who make decisions upon how farmers are to live: usually they say this should be on the farms, and it is only later recognized that it is impossible to provide people living on isolated farms with the ordinary community facilities, unless the country is very rich as happens in the United States. This therefore becomes no answer to the social problem of the farmer. Then we have military people and traffic engineers who take decisions upon the lines of major highways. And the planners, in the few countries, where they exist at all, endeavour to deal with the gaps between major projects which have committed the country for generations to come. Beyond this we are obliged to recognize that city planning techniques have only been developed over a period of not even two generations, and this entirely in countries of the West, so that it is scarcely likely that they could be adequate to meet problems in quite other parts of the world. Nevertheless repeatedly the quasi-solutions of the West are employed by Western experts, or experts from the under-developed countries who have studied in the West, as panaceas for totally different condition where, inevitably, they fail.

9. We are forced to recognize that we are not yet facing squarely up to the problems which confront us, in particular the biological growth of settlement in relation to large technical projects.

Doxiadis, C.A. Architecture, Planning and Ekistics --3

10. When I was a child I learned a story, and every time I see the plan of a city I remember the end of this story. Once upon a time an angel came down to earth and found himself standing on the top of a big rock in the middle of a desert. He turned all around but could see no one. At last a caravan approached from the far distance. The angel asked how long the desert had existed. "Well" said the leader of the caravan "my father knew the desert, my grandfather knew the desert and so did all my fore-fathers and all said it had been here for ever." Next day the angel again descended to earth, alighting at the same spot. But he found himself in the center of a great bustling city. Halting one of the passersby, he asked when the city had been created and received the reply "Well, my father lived here and my grandfather and before him all my fore-bears. This city has existed for ever." The third day the angel, again descending to the same place, found himself in the heart of a huge forest. He stopped a woodman and asked him the age of the forest: "My father cut trees in this forest, so did my grandfather and all my fore-fathers. The forest has been here for ever."

11. The moral is very simple: "a thousand ages in God's sight are but an evening gone." Cities which are in fact ephemeral appear to us as eternal. We forget to allow for the fourth dimension of time. Though, in our eyes, cities, towns and villages appear eternal, they follow the rhythm of life: they are born, they grow and eventually they die. Unlike construction projects, cities are not born at one moment; they are born slowly through time. A bridge, a railway, only comes into existence when the last connecting link is put into place, but a human settlement - city, town or village - starts to exist at the moment the first tent is pitched on the site, and changes and grows with time, seemingly for ever.

12. It is this fourth dimension - this eternal change - that makes our profession something different from a technical exercise, and it is just this which makes us nervous. We develop the nervousness of a technician who realizes that techniques of themselves cannot handle the situation. The housing policies of Great Britain put a premium on the 5-room house, tending towards creating a 5-room house for every family: everywhere houses to suit the statistically average family. But families are biological phenomena, born of two persons and finishing with one, even though, at their peak, they may have ten members. We are doing wrong to give a 5-roomed house to a two-member family: to invest the wealth of the country for two people who cannot make full use of it.

13. The architect has a tendency to set up standards like those of the civil and mechanical engineers: after all most architects were trained in technical institutes. But there are no fixed standards in human life. The mechanical standards governing construction within cities is one of the reasons why so large a part of the urban population lives outside the city limits. In India you are not allowed to build within the city unless your house meets certain standards, so people build as they wish outside the city limits and then walk one hour into the city to work, and one hour back. It is like saying to people: if you cannot afford to eat 2,500 calories a day - which is the amount necessary for health - then you may not eat at all. This is, in effect, what the housing standards in several countries are saying today. The same applies to housing densities, just as though we could not

recognize that the enormously high density of a modern 50 storey hotel can give a far higher standard of living than a low density area devoid of basic conditions of public health.

14. Finally how many architects are not still thinking of form whenever they speak of architecture? How many schools of architecture do not still concentrate upon the pattern made by the buildings rather than the life within them.

15. I have now finished with my pessimism and will try to describe some of the things being done to tackle the problems from which perhaps you will gather that the case is not as hopeless as I have presented it. Probably the most important and most hopeful sign is that national housing policies and national planning programs are now being conceived and carried out by a number of countries. It has become realized almost everywhere in the world that the era of the custom built single family house is over.

16. In my own work I try to put forward plans which have all four dimensions built into them. The problems of planning for individual human settlements comprise several elements: first the population itself, then its food (farming), houses, public buildings and community facilities. Then come the elements of the composite group of settlements: individual farms, villages, towns, metropolitan areas, regions, nations. The third dimension must now be included with its factors of the supplies and costs of building materials, labor, and so forth, apart from actual design problems. But even when solutions seen to have been found to all this series of interlocking problems the resultant plan cannot come into existence if we cannot incorporate the fourth dimension and put it into motion: the dimension of time.

17. This will form the starting point for my article next month.

HOUSING

E.H.M.T.

Koren'kov, V.
BLOCKS OF FLATS FOR SOUTHERN USSR
Great Britain, Department of Scientific and Industrial Research, Library Communication No. 841, May 1958. Translated by G.N. Gibson from Arkhitektura USSR 1956, (5), 21-24. Illustrations.
728.2 (47)

1. This recently translated article from a Soviet Union architectural magazine deals with the determination of the optimum type of apartments for the southern regions of the U.S.S.R.

2. The Soviet Union has been divided into climatic regions on the basis of mean outdoor temperature in either hottest or coldest months. But humidity and air circulation are also very important considerations in house design in the southern regions. Only the optimum combination of the three components - temperature, humidity and air circulation in the rooms - can ensure a healthy environment in the dwelling in any climatic region. In some regions orientation is important as it influences both the temperature and the insolation of the rooms, as well as air exchange in a flat with through ventilation. These factors affect not only the plans adopted for the dwellings but also the planning of the whole housing area.

3. These questions have been given too little attention in the design of standard dwellings. In the southern regions of the USSR, there are very real differences between the hot-dry zones and the hot-humid zones. Examples of towns in the hot-dry zone are Bukhara and Tashkent (both in Turkestan, Uzbek) and Erivan or Yerivan (in Transcaucasia, Armenia). Examples of towns in the hot-humid zone are Baku (a port on the west coast of the Caspian Sea), Batumi and Bagra (both on the Black Sea). There is also considerable temperature variation in these areas, with the hot-dry areas having much more of a contrast between the hot season and the cold and also a higher variation during a 24-hour period.

4. The London Conference on Tropical Architecture in 1953 distinguished a third kind of climatic region besides the hot-dry and the hot-humid: the cool mountain zone. At this conference it was recognized correctly that different building standards were needed for each kind of zone. For the hot-dry climates the first care must be to protect the rooms of the dwelling from direct and reflected solar radiation. In such areas a considerable lowering of the night temperature in bedrooms by through ventilation must be the basic means of improving the dwelling's "micro-climate." For zones with a hot-damp climate, the conference noted the need for through ventilation of all rooms throughout the 24 hours in summer and also their protection from direct, reflected and diffused solar radiation. (In such zones the atmosphere is heavily saturated with water vapour.) The reduction of atmospheric humidity is essential in buildings, as high relative humidity plus high temperature makes the loss of heat from the human organism difficult.

5. It is very important that architects in the Soviet Union begin to distinguish between zones with a hot-dry climate and those with a hot-damp climate in the planning and construction of dwellings in the southern regions--even though the whole area is classified as a single climatic zone for building standards. There is some support for such a distinction. At the fourth congress of the International Union of Architects, it was suggested that there is a need to consider the nature of the evolution of traditional residential

buildings in a given country before preparing type plans.

6. Although administrative regulations ignore humidity in hot climates, local tradition in the planning and construction of buildings demonstrates the importance of this factor. For example, in Baku, on the Apsheron peninsula, the housing tradition is different from that in the neighboring capitals of Tbilisi (formerly Tiflis, Georgia) and Erivan (or Yerivan) Armenia. The humidity on the Apsheron peninsula is very high during the summer, but the other capitals have a drier climate. Accordingly, although back-to-back flats with stairwell ventilation are permitted throughout the area, they are avoided on the humid Apsheron peninsula though frequently found in the drier cities.

7. With the type of back-to-back flat described, the only ventilation is through a small fanlight over the door facing the staircase; this is inadequate and will not create the "effective temperature" required. Other than Baku, there are a number of towns in Western Georgia on the Black Sea coast which have hot-damp climates. These communities also need to avoid back-to-back flats.

8. In hot-dry climates it is of greatest importance to protect the dwelling by day from direct and reflected solar radiation. It is not reasonable to ventilate rooms with hot outdoor air during the day though ventilation is necessary, especially for bedrooms, in the evening and night.

9. Another special characteristic of the Apsheron peninsula is that of prevailing north winds which are especially unpleasant during the cold months. Combined with regional regulations on orientation, more than half of the horizon is eliminated from the area of possible orientation.

10. Thus a tradition of the architecture of Azerbaidzhan has developed in which typical plans for blocks of flats have "direct" and "reversed" orientation. Where the plan consists of two flats side-by-side with direct orientation, nearly all rooms are located on one side while on the other side there are only one or two rooms and also the staircase, the sanitary facilities and the kitchen. This leaves the principal facade of the building with the most favourable orientation, and only two out of five or six rooms have the less desirable orientation. When using the back-to-back scheme, or otherwise where town-planning requires an unfavourable orientation of the facade, plans with reverse orientation are used, and again most of the rooms have a favourable orientation.

11. Differentiated plans of this kind may be found suitable not only at places having a hot-damp climate plus seasonal cold north winds, but also at places where the cold wind is absent such as the Black Sea ports of Batumi, Gagra, Poti, and Sukhumi. In these places, the use of back-to-back flats in a row is excluded by the necessity of 24-hour through ventilation of flats--the windows cannot be closed even during the sultry part of the day. At the same time, however, open windows facing west or south-west will expose the living rooms to intense solar radiation and overheating, especially late in the day. Using plans with direct orientation, it is possible under such conditions, to utilise fully the favourable part of the horizon in order to avoid summer overheating and insolation and yet provide for 24-hour through ventilation.

Koren'kov, V. Blocks of lfats for southern USSR --3

12. Generally speaking, when the facade of the building and the flats with direct orientation face south, the best sanitary-hygenic conditions are ensured in all rooms year-around. A free and open type of residential building is most desirable for a hot-damp climate, where aeration and the best orientation of the flats are of the first degree of importance.

13. While the heat and humidity in the southern USSR is intense during the summer, the summer does not last so long as in some parts of the world; and winter temperatures go much lower than in parts of northern Africa and South America. (Places such as Algiers, Casablanca, Rio de Janeiro, etc. have maximum winter-summer variations of 13°C and the temperature during the coldest months never falls below +11°C; but in the south of the USSR the variation may be up to 22°C and coldest temperatures are as low as +4°C.) All this should be carefully considered when study is made of experience in the construction of flats in hot climates in other countries.

14. For example, for the climatic conditions of Algiers and French Somaliland (hot or damp climates), architects recommend that the living rooms of dwellings should face only south, while the subsidiary rooms should face north. If it should be unavoidable that some of the rooms face west, lattice wall screens are placed in front of the external walls facing west; and on the windows movable venetian blinds or tightly secured lattices are installed. The latter protect the rooms from direct solar radiation but do not prevent ventilation. The windows openings are larger and reach to the ceiling to prevent a layer of hot air in the upper part of the room.

15. In Soviet towns located in a hot-damp climatic region with a less prolonged period of high temperatures and a more varied climate, the arrangement of fixed lattices at the windows is not justifiable--even less the provision of lattice-screens in front of an external wall. The provision of venetian shutters is very suitable, however. And the preference for a southern aspect of the flat still holds good.

16. In Casablanca, North Africa, there are single-plan or gallery type blocks of flats up to 4 or 5 storeys, with the kitchen and sanitary arrangements located in an open loggia for each flat, and a partition (instead of a wall) between the room and the loggia. These facilities are suitable throughout the year, for the temperature never falls below +12°C in Casablanca. There are some Soviet cities and towns in Transcaucasia which, even with colder climates, show similar arrangements of outside kitchen and sanitary facilities in glazed verandahs. But generally the conditions in Soviet cities are too different from those in North Africa for direct application of building principles arrived at in the latter area--although Casablanca, Algiers, Tbilisi, Baku and Erivan are all situated on about latitude 40°, the actual climatic living conditions are by no means the same.

17. However, the method of locating the kitchen and the sanitary arrangements separately from the living rooms is in itself the great interest for blocks of small flats in the south of the USSR. The climatic factors which should influence the planning and design of typical blocks of flats cross the more generally determined "climatic regions" as well as showing considerable variation within such regions. For example, the Soviet climatic regions III and IV have almost identical summer living conditons. Only in the recently published standards for planning have verandahs and loggias, forming part of

Great Britain, Department of Scientific and Industrial Research, Library Communication No. 841, May 1958.

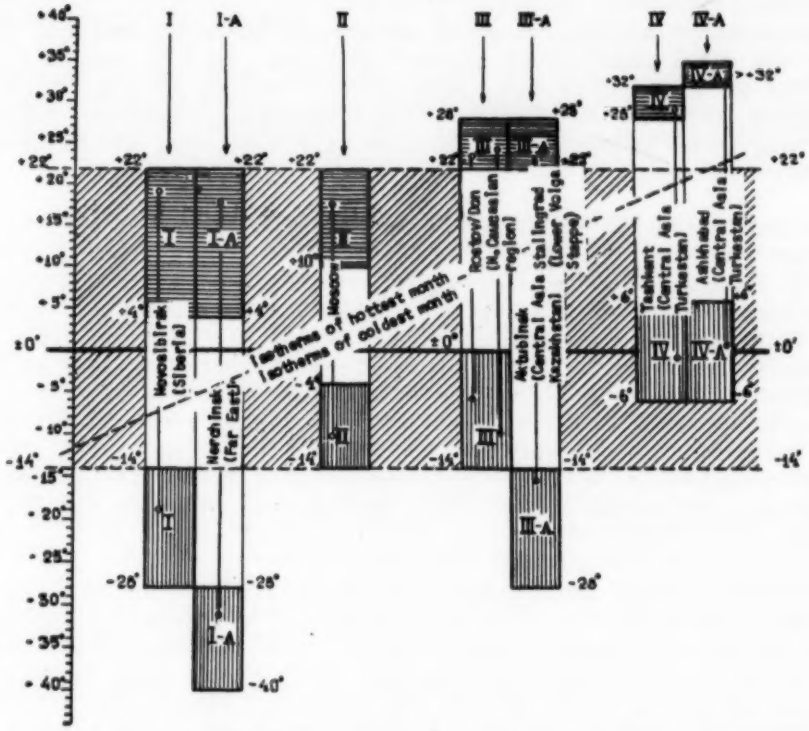
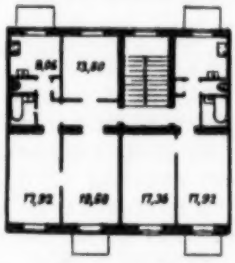


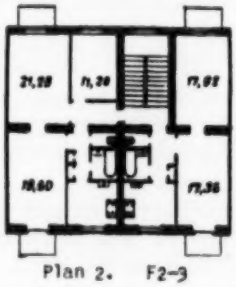
Fig. 1. Diagram of the climatic regions of the USSR. Isotherms of the hottest month and the coldest month. (Climatic regions are indicated by Roman letters.)

Fig. 2. Composition of a series of typical plans of flats in 4 to 5-storey blocks for Baku (port on west coast of the Caspian Sea). Approved by "Gosstroy" SSSR (state building organisation) in the year 1951.



Plan 1. F2-3

Front of building: 2 flats of 2 and 3 rooms, with direct orientation.



Plan 2. F2-3

Front of building: 2 flats of 2 and 3 rooms, with reverse orientation.

the flats and used for domestic facilities, been permitted--and then only in climatic region IV.

18. In the south of France, in North Africa and in South America, verandahs or loggias are quite widely used as part of flats. And in one of the residential areas of Mexico City flats even have balconies or loggias of two types: for relaxation, on the side of the living rooms with a southern aspect, and "working" loggias or balconies on the side of the kitchen and sanitary facilities with a north aspect.

19. Up to very recently, in Soviet practice, this essential element of the southern flat has been underestimated. Balconies of arbitrary dimensions, supported on brackets, or loggias located on the side of the building facing the street cannot completely solve the problem. The principal facades of blocks of flats are usually crowded with external architectural embellishments, and frequently the comforts of the occupants are ignored or even affected detrimentally. Loggias facing the noisy and dusty streets of towns, which are of complicated construction and sometimes arranged in storeys, increase considerably the cost of flats and take up part of the living area. They also deprive the occupants of a comfortable summer room (which is extremely necessary for relaxation in the south) for sleeping accommodation and for domestic requirements.

20. Useful summer rooms forming part of the flat should be constructed in the sectional type of blocks of flats, instead of the numerous unsystematically located balconies and loggias. Depending on local meteorological conditions, these may be built as verandahs or loggias which do not face the street and therefore can be conveniently used for domestic purposes. The loggias, however, must not occupy the living area of the flat: they should be located between projecting external walls. In Central Asia and in Transcaucasia the construction of verandahs designed as part of the flat is becoming increasingly widespread.

21. In popular housing and in contemporary individual single-storey house construction, extensive use has been made of verandahs for domestic purposes, not only in the extreme south, but also in such areas further north as the Don Basin Coalmining region, in Stalingrad, Alma-Ata and Frunze. Private builders find it useful to spend considerable sums on these verandahs, while observing strict economy in everything else.

22. A study of this question leads to the conclusion that the construction of verandahs or loggias, even if only for kitchen, in blocks of flats in a southern region is extremely desirable. Summer rooms of this kind can be suitably constructed with glazing, which permits of their unhindered use during the whole hot half of the year. Where the average monthly temperature during the six hot months at any given point is equal to or exceeds 17°C, such an arrangement is very desirable--in areas where it is hotter it is necessary. To prolong the period of use of the verandahs during the year, it is advisable to build them as glazed verandahs with sashes that open. But in the hot climatic zones, where the average monthly temperature over the six hot months exceeds 22°C, verandahs or loggias should be constructed with lattices which open or with venetian blinds. In very hot regions the blinds will protect the summer rooms from scorching rays of the sun, and here also the

glazing makes possible the use of the summer room in the spring and autumn. Lattice casements and glazed sashes make it possible to regulate the heat conditions in the summer rooms not only during the different months but also for different parts of the day.

23. Glazing of summer rooms will help also to protect the dwelling from dust-bearing winds in the northerly industrial settlements. Where there is marked seasonal variation, verandahs with lattices and glazing should be so arranged that they do not overly darken the living rooms during the cold season.

24. For flats in southern regions, there is a question as to the correct relation between diversity in plans and strict unification of structural elements in the interests of the industrialisation of building. This question relates to whether the climatic characteristics of the southern regions involves a complete difference of plan. If plans are developed in isolation for each zone, then such differences are unavoidable. But there need be no difference if the plans for the whole area (regions III and IV) are developed as a complex, taking into account the diverse conditions of their use. For example, a series of projects for blocks of flats may be complete for the very hot-damp region and for the very hot-dry climate in the extreme south (region IV). In other words, it must contain plans for blocks of flats with direct and reverse orientation, of flats with through ventilaton, and back-to-back flats. The plans, however, can and must be applied in each zone of the very hot climatic region. At the same time, all precast elements and building components specified for production of a series of projects can and must be general and interchangeable.

25. Typical blocks of flats in a series for Ashkhabad and Tashkent (Turkestan, Central Asia) and for Alma-Ata (Kazakhstan, Central Asia) may be exactly the same as regards the volume-plan adopted; and the same type of precast elements and building components may be specified. Flats for Askhabad, however, will have such variations as verandahs with lattices, while those for Tashkent will have open verandahs, and at Alma-Ata, glazed verandahs. It is important that the verandah should have its position determined, not arbitrarily selected, in the plan--even though the position may often be found identical for the three cities.

26. There are possibilities also for differention of plans with regard to other elements and components which will have very slight if any effect on the production loss of factory-made components for a series of blocks of flats. The creative skill of planners must be directed to this aim.

E.G.I.M.Q.T.

Atkinson, G.A.
PROBLEMS OF MASS-HOUSING IN AFRICA AND TECHNIQUES ASSISTING TOWARD THEIR SOLUTION: URBANISATION AND TOWN GROWTH
Great Britain, Department of Scientific and Industrial Research, Note No. E 843, October 1958.
728 : 333.332 (6)

1. This paper was prepared for the Inter-African Conference on Housing and Urbanisation, Nairobi, January 1959. It is based on an earlier paper prepared for the International Congress on Tropical Medicine and Malaria, held in Lisbon in September, 1958. It discusses the problem of mass housing in Africa, referring where necessary to Asian experience. Deficiencies in procedures for clearing shack dwellings have prompted an acceptance of the fact that many town dwellers will live in huts for some years to come. To control their development, building rules are being adopted in a number of places. Housing standards and particularly the need to provide private outdoor living space are discussed. The effect of lodging houses is noted. G.A. Atkinson is Colonial liaison Officer, Building Research Station, Department of Scientific and Industrial Research, and Housing Adviser to the Colonial Office, United Kingdom.

The Realities of Urban Housing

2. Disorderly, insanitary shack communities in and around towns are to be met with in many parts of Africa, Asia, the Caribbean and Latin America; sometimes also in Europe. Estimates of the number of families living in shack settlements, or in other equally unsatisfactory accommodation, are little more than of academic interest. Information, based on survey, of the ways in which families are housed in tropical towns is scarce.

3. Two recent surveys give a picture of conditions in Asian and African towns: Singapore (1953-54) and Jinja, Uganda (1957). In Singapore, one in five of lower-income households within city limits were living in 'attap' dwellings (timber huts with thatch roofs, mostly sited chaotically); one in three lived in 'shop houses' (upper floors of bricks or concrete buildings, usually divided into overcrowded cubicles); and only one in eight were in government built and managed housing. In Jinja, a newer community with a large temporary worker population, one in three lived in African-built and owned housing on the fringe of the town, mostly mud huts with thatch or metal roofs not conforming to building rules and sited haphazardly. Another third lived in housing provided, usually free of rent, by employers, varying greatly in quality from neat police quarters to old, neglected labour lines. Between one in four and five lived some distance from the town in rural surroundings. Only one in ten was housed in estates built and run by the government as a social service.

4. These figures, from places where social housing activity is above average, indicate the scale of the problem facing many countries. Few governments can afford money or technical resources to house as a social service more than a small minority of urban families. Only model or large employers are willing or able to house satisfactorily many of their workers. The mass of town dwellers must, therefore, depend on their own initiative or on that of private entrepreneurs for shelter, and often find it in shack settlements or overcrowded cubicles. Where public authority is able, it condemns and clears such

areas. But poverty - private and civic - often precludes rehousing everyone in permanent buildings at an acceptable standard. Those not so housed take any compensation offered and move to spots where authority is less able or willing to control them.

5. These deficiencies, especially when the government is under pressure of disaster or has urgent need of squatter-occupied land for essential development, have prompted a reappraisal of methods of clearance and compensation. These and complementary measures to control new, and to administer and improve existing settlements are discussed below. Broadly speaking, they have meant accepting the realities of the situation, particularly the fact that many town dwellers will have to live in huts for some years to come and that, consequently, this form of mass housing cannot be ignored or condemned outright.

Graded Building Rules

6. Building rules in most tropical countries are modelled on western examples. Enacted first at the beginning of the century when, at least in many African and Asian towns, protection of European officials and traders against tropical disease dominated urban sanitary policy, they set standards for domestic building related more to what was desirable in an official quarter than essential for mass housing. The rules, especially when brought up to date in light of recent knowledge, have largely prevented shoddy building and, especially in crowded central areas, given protection against risk to life of structural collapse and fire. They have also ensured reasonable sanitary conditions. But, for many families, dwellings built to legal standards are too costly for occupancy except when seriously overcrowded.

7. Many, therefore, have to live in huts built illegally or beyond town limits. Though more flimsily built and haphazardly sited, these dwellings are not without merit. They are likely to be less overcrowded than more solid 'legal' buildings. In Singapore, 81% of the 'shop houses' in the sample surveyed were overcrowded compared with only 59% of the 'attap' huts. At Jinja, greatest overcrowding was found in the, usually well-built, employer housing. In Kampala, many Africans prefer this kind of housing to the more sanitary and orderly government estates.

8. To lessen the contrast between solidly built - but probably overcrowded - urban dwellings and their flimsier illegal fellows, some governments have adopted graded building rules which permit less substantial houses in selected parts of towns and facilitates bringing fringe settlements under control. Uganda introduced in 1955 a procedure by which areas are set aside where modified building rules apply. Three grades of rules have been adopted:

I - The normal standard of urban building;

II - Permitting small houses (up to 1000 sq ft or 92.9m2 in floor area) with mud walls but a durable, non-inflammable roof;

III- Permitting temporarily the erection of still simpler houses with thatch roofs.

In the modified rules, siting and the provision of kitchen, wash space and latrine are considered more important than materials and methods of contruction.

(Grade II permits habitable rooms as small as 80 sq ft or 7.4m2; no minimum size is specified in the Grade III rules.)

9. The ministerial circulars which brought the new rules to the notice of urban authorities in Uganda required that the selection of areas where the simpler rules would apply should be made in consultation with the government town planner, who would prepare layout plans, and the Director of African Housing, who would either undertake direct control of the scheme (in some principal towns) or assist with advice, model house plans and sometimes finance for initial service. The health authority had also to be consulted. Arrangements were made for granting leases to householders (for ten years or more in Grade II areas).

10. Similar procedures have been adopted or recommended in other countries. At a conference on urban problems in East and Central Africa held in February, 1958, four of the six represented territories had adopted graded building rules; and five had arrangements to help householders to build with simplified, normal rules.

Housing standards

11. The fixing of standards for mass housing in tropical countries was studied at length during the 1954 United Nations Regional Seminar on Housing and Community Improvement in Asia and the Far East. The guiding principles recommended are capable of application to the situation in many parts of Africa. Attention is drawn to the need for providing each dwelling with its own latrine and wash space; to define living spaces by a suitable floor area, based on the size of families to be housed, rather than by fixed room sizes; and to make the best use of out-door space.

12. Often, when an organized system of sanitation has been provided for mass housing, communal latrines are built. Even when well maintained - and good maintenance is costly - families dislike them. Neglected, they are a source of illhealth. The experience of the Uganda African Housing Department, which has been replacing communal latrines with individual pit latrines on its social housing estates, confirms the writer's personal observation that most tropical families keep individual latrines clean, but that communal sanitation is seldom satisfactory.

13. A comparative scale of living space commonly available under various circumstances in different parts of the world is suggested and shows a range (in m2 of gross floor area/person) from over 18 for middle-income professional families, 13-17 for postwar social housing in Western Europe, 8-12 for recent housing in Eastern Europe and some Mediterranean countries, 4-9 commonly provided in mass housing in Africa and the Caribbean, 3-5 for Hong Kong and other densely crowded Asian cities, to 0.75-2.75 for seriously overcrowded conditions.

14. For low-cost tropical housing, minimum areas should be based on the space per person required for sleeping, but the number of rooms available to a household is important if there is to be some measure of privacy and amenity. In a warm climate, many household activities take place outdoors, especially where there is a private yard. The dwelling, at least with the less well off, serves mainly for sleeping and storage; indeed in drier climates it is possible

or even preferable to sleep outdoors in the hot season. Where there is less than 8-9m2 (about 85-95 sq ft) per person available to a five person household, it is likely that all the main rooms will be occupied at night, even if one is furnished as a dayroom. Where the total area is less than 4m2 (about 45 sq ft), it becomes difficult to provide two rooms and separate kitchen and bath rooms. At $2m^2$ (just over 20 sq ft) there is hardly space at all for cooking or washing, even if beds are in tiers.

15. In many African countries, the majority of less well-off households not living under conditions of severe overcrowding are probably now occupying between 4 and $9m^2$ (43-97 sq ft) of space per person. In places where housing is scarce, families given accommodation much in excess of the local average are likely to sub-let part of it. It is suggested that greater attention be paid to facilities like individual latrines and private yards than to attempt to build larger dwellings.

Densities and Total living space

16. Emphasis on private outdoor as well as indoor space suggests an approach to residential densities aimed at ensuring sufficient space around as well as within dwellings. Densities in housing areas have been related to the total living space (indoor and outdoor) and space per person within a dwelling. Many factors influence choice of a total living space standard: availability of land; space for access, light and air, household activities, recreation and sometimes food-growing; prevention of spread of fire; safe disposal of soil water and other waste matter, etc. In turn, such factors may depend on local social and economic conditions, climate and soil.

17. The total living space available in a number of tropical housing schemes ranges from 40 sq ft ($3.7m^2$) in Hong Kong resettlement tenements to 500 sq ft or more in semi-urban schemes with space for food-growing or even, as in the Singapore scheme, small-scale market gardening. Corresponding housing densities range from 2100 persons/acre (5250/hectare) to 30-40 (75-100) or less.

18. Hong Kong experience shows that very high densities in well-managed, multi-storey concrete buildings with engineered services may be technically adequate for the emergency housing of homeless people; but they hardly provide any privacy or social amenity.

19. Single-storey houses with plots of less than 1000 sq ft ($90m^2$) like the Karachi and Indian schemes may, if not seriously overcrowded, give densities of 200-300 persons/acre (500-750/hectare). Built in fire-resistant construction and provided with engineered services, housing at such densities seems technically acceptable; with walled yards it gives reasonable privacy at a total living space per person of 100-200 sq ft ($9-19m^2$). The two-storey Kenya scheme would provide much the same conditions.

20. In a number of African towns, mud-walled houses with metal, or sometimes thatch, roofs are built on 1500-2000 sq ft ($140-185m^2$) plots; typical is the example from Zanzibar. When occupied by one family (5-10 persons), densities may range from 100-200/acre (250-500/hectare) and total living space per person from 200-400 sq ft ($18.5-37m^2$)

21. Where soil conditions are favourable (e.g., the fissured coral of Zanzibar and Mombasa) and water is piped, owner-built housing with pit sanitation seems to have no noticeable shortcomings; but, especially where rainfall is heavy or water consumption high, storm and possibly waste drainage may be needed. But similar buildings may be used as lodging houses accommodating many people. Densities rise to 300 or more/acre (750/hectare). Then sanitary conditions deteriorate.

22. Building rules do not usually distinguish between one-family houses and lodging houses, though the distinction may effect densities and, consequently, health. The recommended standards for Tanganyika permit houses up to 1000 sq ft (93 m^2). While it is commendable to encourage such relatively large dwellings if occupied by one family, a many-roomed lodging house may be built accommodating from 20-25 persons (at usual occupancy rates), or up to 50 persons when overcrowding is serious. High densities, low standards of total living space (less than 100 sq ft or 9m^2), and unhealthy conditions result.

23. In drafting building rules for mass-housing, it is advisable to keep maximum permissible floor areas down to about 500-650 sq ft (45-60m^2) in many tropical countries to favour single family housing. Plot sizes will correspond. Where lack of land and other factors require fairly high densities, plot sizes may range from 1500-1800 sq ft (140-170m^2) giving about 1/3 coverage or less. Where there is space and a tradition of food-growing, plots may be double in area. They can then be divided satisfactorily when the community grows and densities have to be increased. Separate rules, with appropriate safeguards, are likely to be required for lodging-houses.

24. Even at higher densities (over 100 persons/acre), mass housing schemes of the occupier-built type require relatively large areas of land. It may be possible to plan these settlements as satellite communities. But topography and other factors may on occasion prevent this. Then it may be necessary to house even the poorest families at high or even very high densities, despite the additional cost. In the Hong Kong Resettlement Department's tenements, exceptional conditions have necessitated very low space standards (planned floor areas as low as 24 sq ft/person, with a total living areas in and around the tenements of 40 sq ft, if the roof area is included. Efficiently built in cross-wall concrete construction, these seven-storey 'walk-up' tenements are costing just over £110 a room. Allowing for management and maintenance costs, ground rent, and capital repayment over 40 years, the rooms are being rented at 17s6d.* a month, a figure within the means of most of the poorest households. That these very low housing standards need to be revised, as soon as the urgent problem of housing the homeless is solved, is fully appreciated. Plans are ready, and prototype flats have been built for the conversion of single room tenements into self-contained flats, at roughly double present space standards. Such extreme conditions, and the high costs and low space and amenity standards which are their consequence, do not yet occur in Africa. They may be avoided if effective use is made of town planning techniques to ensure the orderly growth of towns and their surroundings.

* 17s6d = $2.50

Table 2: Total living space provided in some tropical housing schemes.

(In the following table, plot size is related to gross floor area of dwelling and estimated number of occupants. Where dwelling may serve as a lodging house, this condition was noted.)

Type of Scheme	gross floor area of dwelling sq.ft.	estimated no. of occupants x(if over-crowded or as lodging house)	area of plot sq.ft. (plot coverage)	total living space sq.ft./person
Hong Kong: Resettlement tenements in 5-6 storey concrete building with engineered services [xxi]	120 (excluding common sanitation)	5-6	-	36 (40 with roof space)
Hong Kong Housing Authority, 11-storey flats in concrete with engineered services, including lifts [xx]	413 average	8 average	-	58 (63 with roof space)
Karachi: proposed refugee housing in 1-storey court-yard plan, permanent materials and probably engineered services [xxiv]	275	6	720-990 (30-40%)	120 -165
Kenya: 2-storey, permanent materials with engineered services and walled yard [xxv]	960	12	1350 (35%)	132.5
India, Ministry of Labour, 1-storey terrace or semi-detached brick houses with walled yard and engineered services [xxvi]	250-480	5-6	800-950 (30-40%)	135 -190
West Indies: recommended for 1-storey detached houses, probably timber with pit latrine and standpipe water [xix]	500	5-10	1500 (33%)	150 -300
India, Ministry of Labour, 1-storey semi-detached owner built but with brick kitchen and party walls, pit latrine [xxvi]	500	5-10	1625 (30%)	162.5 -325
Zanzibar: Ngambo, detached African-built 1-storey house, semi-permanent materials with pit latrine and water from standpipe [xxvii]	660	5-10	1900 (35%)	190 -380

x based on four person household

Type of Scheme	gross floor area of dwelling sq.ft.	estimated no. of occupants *(if over-crowded or as lodging house)	area of plot sq.ft. (plot coverage)	total living space sq.ft./person
Tanganyika: recommended for African built housing (1-storey, semi-permanent materials with pit latrine, probably water from standpipe) [xviii]	1000	5-10 *(20)	2000 (50%)	200 -400 *(100)
Uganda: Grade II building rules, detached African-built 1-storey house, semi-permanent materials with pit latrine and water from standpipe [xxviii]	1000	5-10 *(20)	2800 (35%)	280 -560 *(140)
India: HERL village house, detached with mud walls/ thatch roof, pit latrine [xxix]	500	5-6 *(10)	1800 (28%)	300 -360 *(180)
India: Delhi Exhibition, Bengal Engineering College model house. 1-storey semi-de ached built with planned open space for food growing and household activities [xxix]	600	5-6 *(10)	2500 (24%)	320 -500 *(250)
Latin America: CINVA rural detached, 1-storey built by family; probably pit sanitation [xxx]	684	5~~6~~ *(70)	2325 (29%)	388 -465 *(232)
Singapore: semi-urban smallholder resettlement scheme in timber/thatch with pit sanitation [xxxi]	530	5-10	4336 (12%)	434 -867
S.Africa: detached house in permanent materials with engineered services, planned garden for food growing and recreation [xi]	625	6 *(10)	3125 (20%)	520 *(312)
S.Africa: detached house, planned garden for food growing with pit latrine [xi]	650	6 *(10)	3170 (21%)	530 *(317)

E.M.T.

United Nations, Economic Commission for Europe
HOUSING COMMITTEE OF ECE MEETING IN ROME
Information Centre, European Office of the United Nations, Geneva,
Press Release No. ECE/HOU/50, 21 November 1958.
341.16 : 728 (100)

1. The Economic Commission for Europe's Housing Committee held its 17th session in Rome, November 12 to 14. Awaiting a published report on the procedings, we include the contents of a summary press release on the session.

2. The effect of Government measures designed to promote the technological development of the building industry and reduce housinc costs was one of the questions to which the Committee devoted most attention. One of the basic objectives of the enquiry was to establish which ways of building had been most successful in reducing costs or in increasing productivity, why they had been successful, where there had been difficulties and why.

3. The discussion was concentrated mainly on the trend of costs and prices, the organization of demand, the organization and structure of the industry, the technological development of the industry and the application of research. The International Federation of Building and Public Works offered to assist in the collection of additional data.

4. Among the other items on the Committee's agenda, the following were also examined: standardization and modular co-ordination, housing for the disabled - on the basis of a provisional report prepared by the World Veterans Federation - the utilization of space in dwellings, urbanization and town planning, housing problems of less industrialised countries, and technical co-operation. In connexion with the last item, the International Council for Building Research, Studies and Documentation (CIB), informed the Committee as to the reactions to its proposed scheme for the regular provision of a building documentation service on a self-supporting basis.

5. When examining its programme of work, the Committee decided to insert a paragraph about its work on technical co-operation, emphasizing the need for such co-operation and for all-European contacts to improve it. The Committee met under the chairmanship of Mr. Bonnome (France) and Mr. V. Cervenka (Czechoslovakia) was Vice-Chairman.

8. The following international non-governmental organizations also attended: The International Centre for Regional Planning and Development, the International Confederation of Free Trade Unions, the International Co-operative Alliance (ICA), the International Federation of Building and Public Works (FIBTP), the International Federation for Housing and Planning (IFHP), the International Federation of Building and Woodworkers (IFBWW), the International Real Estate Federation (FIABCI), the International Union of Architects (UIA), the International Union of Family Organizations (UIOF), the world Federation of Trade Unions (WFTU) and the World Veterans Federation (WVF).

PLANNING

E.F.G.I.O.

Kaplan, Samuel
LOMAS DE SANTA FE: A HOUSING AND COMMUNITY DEVELOPMENT IN MEXICO
Americás, December 1958, pp. 5-8. Illustrations.
711.58 : 728 (72)

1. This is a discussion of the first Housing and Social-service Unit of the Mexican Social Security Institute, which is located a few miles from Mexico City.

2. Lomas de Santa Fé shelters about twelve thousand people in its 2200 dwelling units and was built at a cost of 62 million pesos (about 5 million US dollars). In design, it follows many of the principles of the self-sufficient community which have been developed elsewhere in Latin America, but Sante Fé is on a larger scale and offers even more than housing, recreation, schools and shopping centers. Medical, cultural and welfare services are built into the community as an integrated program.

3. To qualify as tenants, workers must be covered by the Social Security system and must be employed within a specified area. The place-of-work limitation is intended to keep the time and cost of journey-to-work at a minimum. Applicants must also meet certain requirements regarding income (e.g., no more than 25% of income may go to rent), family composition and housing need.

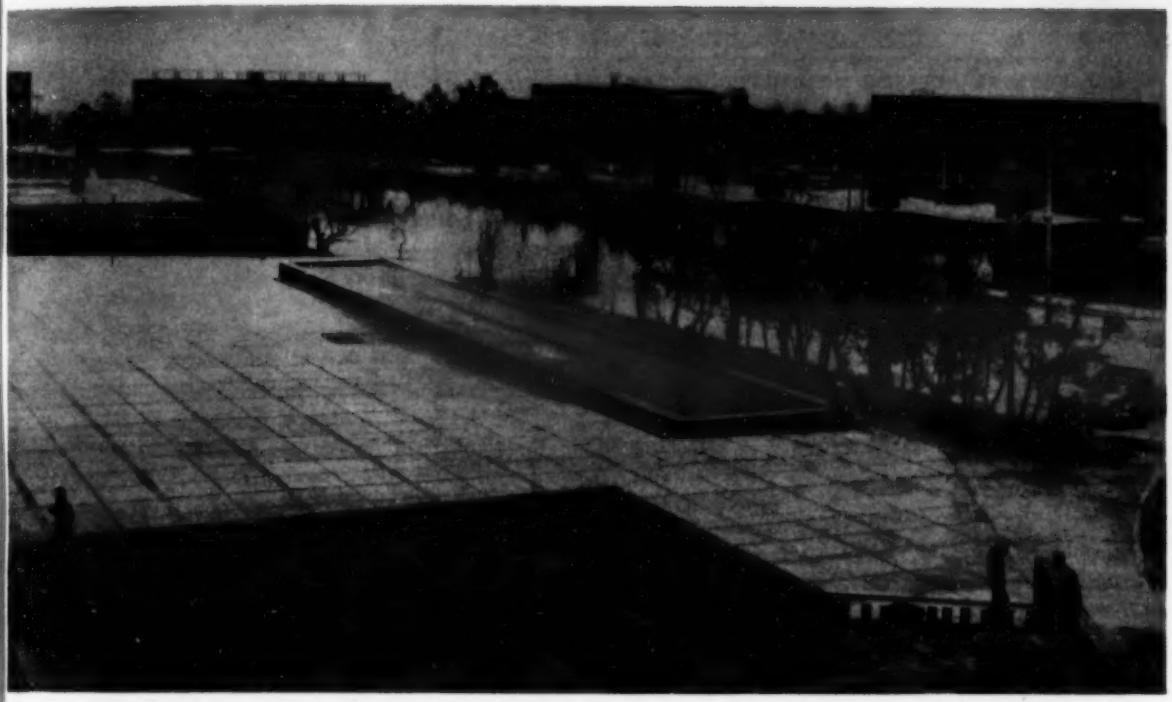
4. Rents, which vary betwen 100 and 250 pesos ($8 to $20 US) per month and include gas for cooking, are well below those for comparable private housing. Yet even these low rents are sufficient to amortize the construction cost plus 5% interest within fifty years, the useful life of the buildings.

5. The community occupies 66 acres of previously undeveloped land. Its layout assures safety and enjoyment for the pedestrian: Main roads are limited to the perimeter, and cobblestone paving on the secondary roads effectively warns the driver to go more slowly.

6. There are 23 apartment buildings, in three basic patterns. Most of the 932 apartments have one bedroom, but some have two. Additionally, there are 1268 individual houses, having up to four bedrooms. All dwellings are built to last, with attractively painted concrete walls, metal window frames, double lined metal doors, copper bathroom pipes, solid color floor tiling and half-tiled walls in kitchens and baths. These dwellings are in sharp contrast to the shacks or shabby tenements from which the residents came.

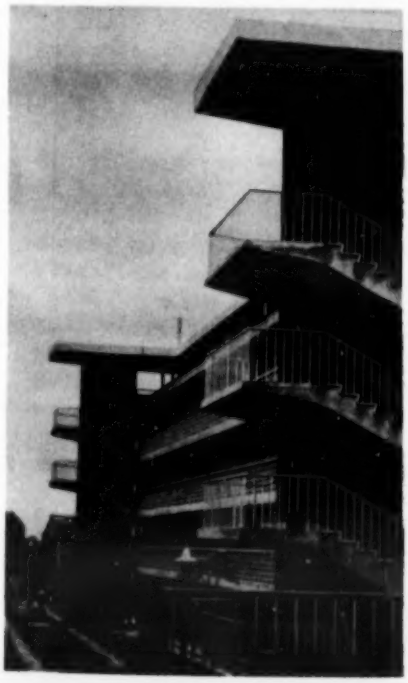
7. Three nearby commercial zones provide handy shopping in a supermarket and a variety of retail shops. These commercial zones have low store rents and controlled prices, for the benefit of residents of Santa Fé.

8. The three most used elements in the active Social Center are the auditorium, the gymnasium and the "casino." Movies, plays and lectures take place in the auditorium. Both young and older adults participate in active athletics in the gymnasium and on five sports fields designed for basketball, soccer and volleyball. Space for baseball is also provided. The "casino" is the most popular element in the Social Center. Light refreshments are sold here, and space is provided for relaxation with friends, playing ping-ping or chess, etc.; there is a reading room and a circulating library, as well as

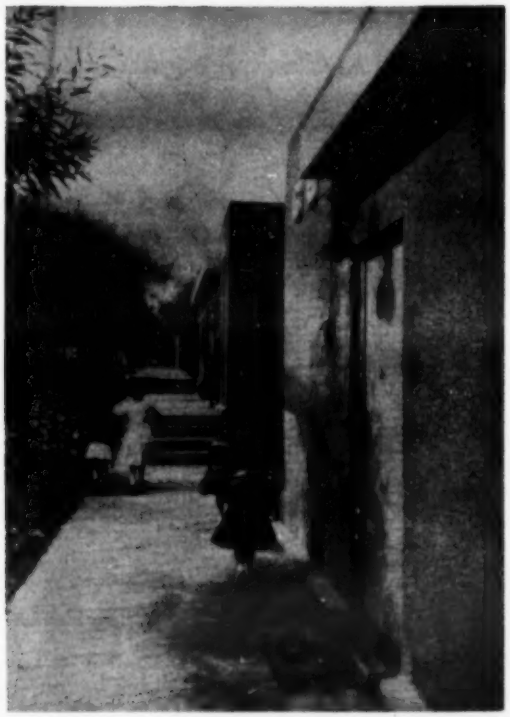


With open spaces and flashing fountain in Plaza of Heroes, Santa Fé is far cry from crowded tenements

One of twenty-three apartment houses in three different models. Unique planned community built by Mexican Social Security Institute provides 932 airy, neat, inexpensive apartments



Setting enhances one-family houses that give low-income workers chance to enjoy a home of their own at modest rent



television. On the mezzanine various classes for women and girls are held; dress-making, cooking, first aid, toy-making, interior decorating, choral singing, folk dancing. Also on the mezzanine are youth clubs and a supervised study hall.

9. Two kindergartens take care of 200 three- to five-year-olds, who have a wading pool in the garden. A day nursery can look after ninety infants whose mothers work. Both the kindergarten and the day nursery have the daily attention of a pediatrician, nurses, and maids. The primary school has 2500 attending morning and afternoon sessions for ages six to twelve.

10. Under the Social Security system, the workman and his dependents receive free medical care including treatement by specialists. There are X-ray and clinical laboratories plus a pharmacy on the grounds. Patients requiring hospitalization, including maternity cases, are sent to hospitals maintained by the Social Security Institute.

11. Projects such as Santa Fé meet a very real need in Mexcio City and in other parts of Mexico. At the time the project was undertaken, three years ago, there were some 1.8 million people living in dwellings which failed to meet minimum standards in the Federal District--this was 44.2% of the total population. This project was opened in 1957, and it is the policy of the Government that such benefits should be spread to others in Mexico City and throughout the nation.

G.J.O.

Hertzen, Heikki V.
TAPIOLA GARDEN CITY
News Sheet of the International Federation for Housing and Town Planning, No. XLIX, September 1958, pp. 12-16. Illustrations. Text in French, with summaries in German and English.
711.4 (480)

1. This article describing Tapiola, Finland is taken from an earlier article in Arkkitehti-Arketikten. Heikki V. Hertzen is a Finnish architect-planner.

2. Tapiola, six miles west of Helsinki on the Gulf of Finland, was begun in 1952 by the Asuntosaato, or Housing Foundation. The city covers 600 acres and is intended for a total population of some 15,000, to be accommodated at a density of 26 to 30 persons per acre.

3. The community is divided into three neighbourhood units, separated by greenbelts, and situated around the town centre, which contains the administrative, business and cultural establishments. Streets have been kept to a minimum and tend to follow topographic contours.

4. The most frequently found type of residential building in Tapiola is represented by "tower" houses of 3-4 storys. This type is best fitted to the garden city and to the terrain. There are also traditional buildings of 3-4 storys, as well as taller houses consisting of small apartments only. Experimentally, individual houses have been built in continuous rows or "chains," both of wood and of masonry. Most houses were built according to traditional methods, but prefabrication and other new methods were tried too. A few detached single-family houses, of prefabricated wood construction, were built for ownership, and these have either 1 1/2 stories or are without basement.

5. All kitchens are furnished with electric stoves and standardized fixtures; and some apartments have kitchen-bars. A bath is provided in all apartments except the single-room units, which are provided with showers. It is expected that refrigerators will be placed in each kitchen.

6. Single-family detached "ownership" homes have 5 rooms and a floor area of 1,075 sq ft. Row houses are somewhat smaller with a floor area of 935 sq ft and either four or five rooms. Flats in the three-story of four-story blocks have between one and four rooms. Single-room apartments in such blocks have floor areas of between 260 and 365 sq ft.

7. Service facilities (power plant for heating, hot water and electricity) had all been established and were functioning when the first residents arrived. By that time the shops, housemanager's office, the bank and the post office were also in operation. An adequate number of mechanical laundries, drying rooms with electric fans, a cinema, club rooms and cafes plus the all-important steam baths ("sauna") cover a total of about 7% of the overall building area.

Commercial and Cultural Centre

8. The site had a gravel-pit in its center, and this was converted into a swimming pool. Around this body of water, in an area of more than 2.5 acres, the construction of public buildings, offices, a shopping center, a restaurant, a church and a theatre were proposed. The major part of the centre will be

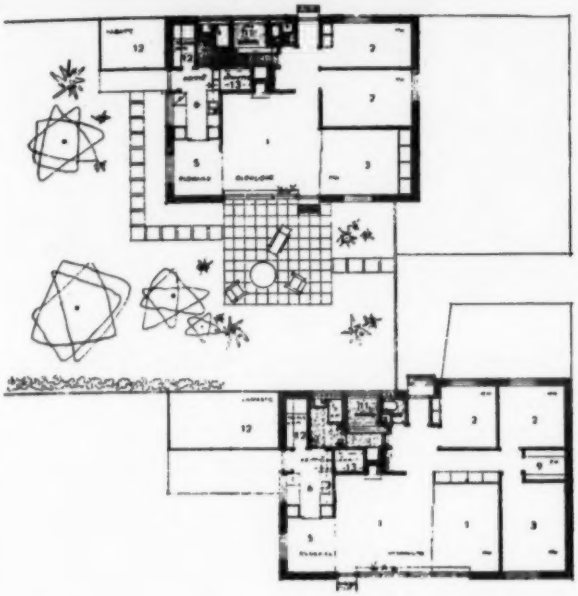
reserved exclusively for pedestrians, with all vehicular traffic excluded. Appropriate streets will be provided on the periphery of the centre. Parking for 300 automobiles is also part of the plan, but all traffic in the city will be local. Convenient and frequent rapid transit to Helsinki is provided by bus.

9. Outside the cultural and commercial centre, Tapiola has two secondary centres. The first of these already has been realized. Shops are located among residential groups in such a way that the maximum distance from them to residences is never more than 250 metres.

10. Light industry and artisan shops have a zone, separated from residences by a green belt. The Foundation favors industries which use electricity, since they are quiet and smoke-free. Work for 600-700 persons is expected, which would represent 15% of Tapiola's families. Employment in administrative offices and in stores will also be important, and it is expected that a third of the population will work within the city. (A major industrial centre is projected to the west of Tapiola, and probably some of the residents will find work there). In all, perhaps half of Tapiola's residents will work close to home.

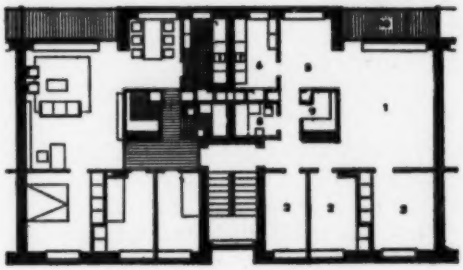
11. The Housing Foundation provided the roads and streets, water and sewerage system, electricity works, etc. A joint-stock company was formed for each group of buildings. In these groups, which actually own the buildings, each inhabitant owns a certain number of shares entitling him to the occupancy of a specified dwelling unit. The housing company, in turn, holds shares in the "Supply Company," which is responsible for the heating and water supply, the collection and incineration of waste and rubbish. The "supply company" also looks after the parks, kindergardens, clubs and recreational institutions.

News Sheet of the International Federation for Housing and Planning,
Number XLIX, September, 1958.



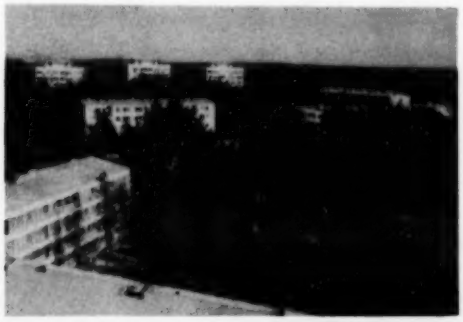
One family house. 5 rooms + kitchen + sauna (1076 sq.ft.) and 4 rooms + kitchen + sauna (872 sq.ft.) / Habitation individuelle. 5 pièces + cuisine + sauna (100 m²) ei 4 pièces + cuisine + sauna (81 m²). / Einfamilienhaus: 5 Zimmer + Küche + Sauna (100 m²) und 4 Zimmer + Küche + Sauna (81 m²). *Arch. Jorma Järvi.*

4 storey walkup tower house. 3 rooms + dining corner + kitchen (742 sq.ft.) and 2 rooms + diningkitchen (489 sq.ft.). / Immeuble-tour d'étages, sans ascenseur. 3 pièces + coin à manger + cuisine (69 m²) et 2 pièces + cuisine avec coin à manger (45,5 m²). / 4 geschossiges Punkthaus (ohne Aufzug). 3 Zimmers + Essraum + Arbeitsküche (69 m²) und 2 Zimmer + Essküche (45,5 m²).
Arch. Esko Suhonen.



Multi-storey flats. 4 rooms + dining corner + kitchen (914 sq.ft.) / Appartement-type en immeuble collectif. 4 pièces + coin à manger + cuisine (85 m²). / Wohnungstyp im Mehrfamilienhaus. 4 Zimmer + Essplatz + Arbeitsküche (85 m²).
Arch. Markus Tavio.

1 Living-room / Séjour / Wohnraum
2 Children / Enfants / Kinder
3 Parents / Parents / Eltern
4 Sleeping / Alcove / Schlafkoje
5 Dining-room / Salle a manger / Essraum
6 Kitchen / Cuisine / Küche
7 Kitchenette / Kitchenette / Kochnische
8 Bath / Salle de bain / Bad
9 Storeroom / Débarras / Abstellraum
10 Balcony / Balcon / Balkon
11 Sauna / Sauna / Sauna
12 Supply room / Réserves / Lager
13 Heating-control / Réglage du chauffage / Kontrolle der Heizu.



C.D.J.N.O.

The Canadian Architect
HUMAN HABITATION AND NEW TOWNS IN THE CANADIAN NORTH
November, 1958, pp. 36-43. Illustrat
711.13 (71)

1. This is an attempt to define and describe the "North" of Canada as a place for human habitation, especially for the more concentrated human grouping contemplated in new towns. Several such new towns are being planned--and built. This background article serves as an introduction to the three discussions of specific new towns.

2. The "North" falls into what the world climatologists call the boreal and the arctic regions. A great deal of the land area of Canada also falls into these regions, though probably 90% of the population live within 250 miles of the border of the U.S.A. (The only places of any great size farther from the international border are St. John's, Newsfoundland and Sydney, Nova Scotia).

3. It is the people who don't live along the border strip who will live in the new settlements now being planned for the north. There are about 30,000 residents now in the north, including about 10,000 Eskimos and 5,000 Indians.

4. The two administrative units which make up the north of Canada are the Yukon and the Northwest Territories. Together they have more that 40% of the country's land area but only 1/5 of 1% of the national population. In "The Territories" (Yukon is included colloquially in the term) the density of population is two people for every 100 square miles; for Canada as a whole the density is 475 people for every 100 square miles.

5. Much of the early thinking which has gone into consideration of the problems of human habitation in the Canadian north has developed around Government aid to the Eskimos. Both the Eskimos and the Indians can get special loans from two different government departments for housing and other purposes. Some experts disdain the use of wood as a building material, but it is felt to be the best available in the north by others. The main objection to wood is the danger of fire in the dry northern conditions--as well as the difficulty of fighting fire in the frigid, windy weather. Even in official circles there seems to be some difference of opinion about what makes the best housing for Eskimos (and also for Indians). The traditional igloos and summer tents have been blamed by some for the high infant mortality and general low life expectancy of the Eskimos. But others claim that disease is the gift of the white man and unrelated to the type of dwelling. These experts feel that it is a real challenge to match the igloo's comfort, convenience and usefulness. In some cases, the government has tried a variety of house types of various materials (but usually with wood frames), including prefabricated units shipped long distances. The Eskimos are usually allowed to decide among themselves who should receive the limited number of houses allotted, and sites are chosen by their future owners. (In a case cited, the Eskimo chose a long level ridge, usually blown free of snow, in preference to a sheltered site.)

6. The main task of housing and planning for more extensive human habitation of the north is in holding those who go to the north there and in attracting new inhabitants. The provision of adequate conveniences can do much to achieve these ends.

The Canadian Architect. Human habitation and new towns... --2

7. The main industrial activities which may be expected to locate in the north are extractive, primary ones. Many of these will be mining industries, and in fact most of the new towns now being built in Canada are mining towns. Mines have an average life expectancy of perhaps 30 years, and this fact has led some to suggest that it is not worth carefully planning such towns. But such planning can be very well handled if it is well planned as a semi-permanent settlement, with financing properly handled on a 20- or 30 year basis. (Such is the practice further south, where it is much less appropriate.)

8. Distance is the great barrier in the development of the north through industrialization. To combat the feeling that the "Territories" are wholly inaccesible to economic development, the government is presently undertaking a $100 million "development roads" program and another $150 million "roads to resources" program with the provinces. Yet the railroads are felt to be the quickest way to bring industrial development to the north, but only the Mackenzie District of the Territories seems likely to gain immediately from the provision of a railroad line.

9. The construction of the DEW line (Defense Early Warning) forced the consideration of the problems of life in the far north. Consisting of a string of stations which is 3,000 miles long, the DEW line has between 20 and 200 sites. There are many details of this defense project which are not public, but the success of their constructions under harsh weather conditions in less than two and a half years shows a great deal of promise.

10. The principal building on each site is made up of one or two 'trains' containing from 5 to more than 50 modules formed of prefabricated panels. These modules are usually assembled in an erection tent or under some other shelter; their dimensions provide for 16 ft width, 28 ft length and 10 ft height. After general assembly, each module is fitted with as much electrical and mechanical equipment as possible; and they are moved on sleds, sometimes over great distances, to the building sites. The modules are placed side by side, six inches apart on timber foundations, and the spacing closed in and filled with fireproof insulating material. Access to all modules of the train is provided through a corridor extending the length of the train. More than 1,000 modules have been needed for the project.

11. At most of the major sites the trains of modular buildings are formed in an H-plan. One of Buckminster Fuller's geodesic radomes, 55 ft in diameter, sits on a high platform above one end of one arm of the H.

12. Many of the human and technical problems of northern living were cristalized by the DEW line. There are several aspects of its importance: the extraordinary and intricate construction carried out under severe conditions, the treatment of problems of supply and transportation on a greater scale than any previous northern project, the training of men to live under conditions hardly dreamed of, and the closer contact between white man and Eskimo.

13. The same problems, though less extreme, exist in Canada's day-to-day dealings with the north. Really basic social, economic and technical questions have to be considered and decisions must be made. For the architects, planners and engineers, certain aesthetic as well as technical tasks lie ahead. "For if the technical answer is a horrid mess on the landscape, it will, in the long run, be no answer at all."

C.J.O.

Canada, Dept. of Public Works and Dept. of Northern Affairs.
FROBISHER BAY, FEDERAL GOVERNMENT PROJECT FOR A NEW TOWN
The Canadian Architect, November 1958, pp. 44-49. Illustrations.
711.43 (71)

1. This is the description of the preliminary plans for the new town of Frobisher Bay in Canada's Northwest territory. These are only portions of the work which will have to be done in designing for the very far north but will provide a glimpse of the exciting thinking going on. The work has been done by the Federal Department of Public Works for a Frobisher Bay Development Committee which includes senior officials of that development and of the Department of Northern Affairs.

2. There are two main centres for government administration in the north of Canada--Fort Smith for the west and Frobisher Bay for the east. Both places are above the 60th parallel and both have been administrative centres for some time. Now the government is mulling over the problems of building them up for an accelerated development of the north. In considering these questions, top officials of the departments of Northern Affairs and the Public Works have been taking a totally fresh look at living and working in this treeless, permafrosted part of the country.

3. Here presented are part of the preliminary studies currently being made by these two departments for the housing of some thousands of people, and their recreational and even work places in a complete integrated building complex.

4. Essentially, the proposal consists of a tightly-planned town centre totally enclosed within a large protective dome, and surrounded by 36 apartment towers. The towers would be in 12 groups of three, each group of three serviced by an external elevator shaft discharging into the town centre. The towers are 12 stories high.

5. In working out this proposal the planners first considered many schemes: among them a townsite excavated into a hillside; rowhousing linked by corridors; and apartments built round roofed-in courts. High construction costs, the need for privacy, the extreme cold, protection of women (which ruled out any large unpatrolled areas or passageways), were all points which had to be taken into consideration. The present proposal seemed to satisfy these and other requirements. It would provide a refreshing contrast to the often bleak and inhospitable countryside around. The protected town centre could be heated to at least a bearable temperature. (with -40°F outside temperatures, the centre would have an inside temperature of 15-20°F. Winter clothing but not overshoes would be required. Communal buildings would be heated to 70°F.) This sort of heating would mean that the design of individual buildings inside the dome could be considerably freed, since their outside surfaces would only be thermal and acoustic barriers. The open spaces under the dome would be heated by the return warm air from the various buildings' ventilation ducts.

6. Design of the apartment towers is based on a development of sliding-form concrete silo construction with lift-slab floors. Because of the extreme temperature drop at peripheral walls, double wall construction would be used, with the two walls 4ft 6in apart. The area between them would provide for balconies in the summer. The apartment rise in corkscrew fashion; each unit

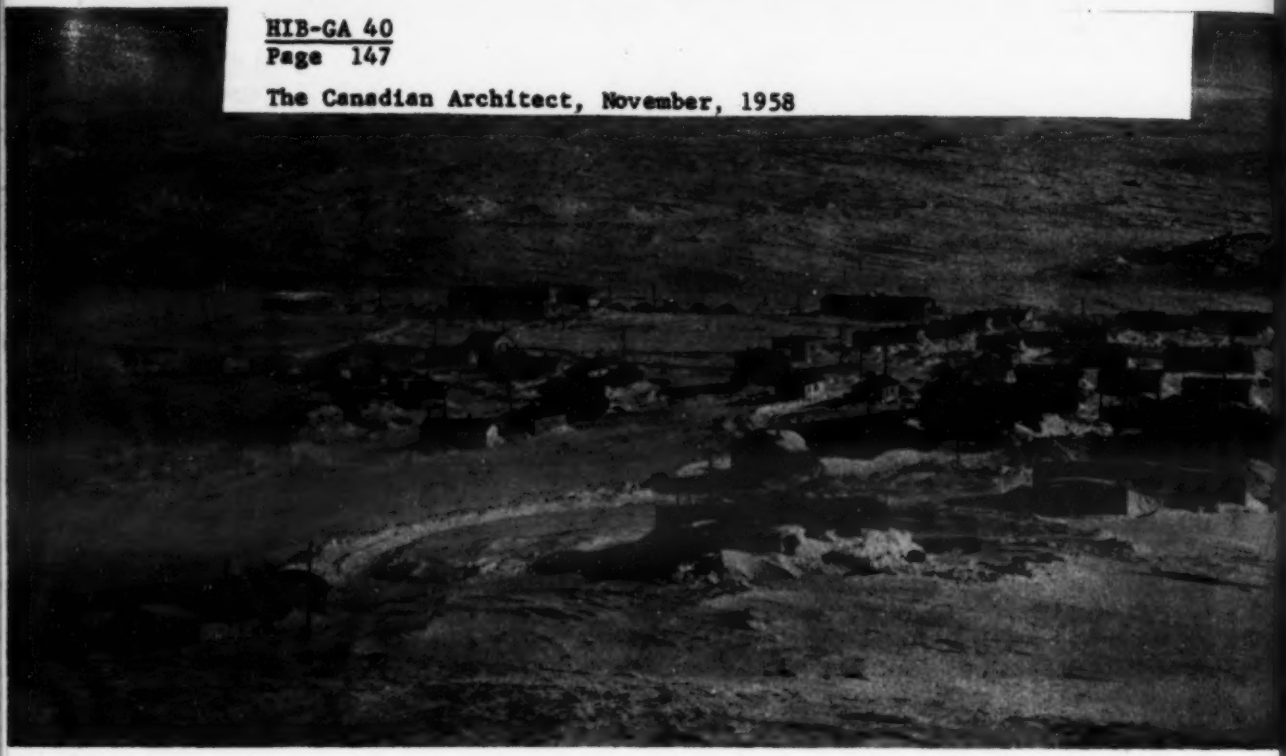
Canada, Dept. of Public Works... Frobisher bay... -2

opens onto its own landing, some feet higher than its neighbour in a clockwise direction. Two basic plans have been evolved for the apartment towers, one providing accommodation for families, the other for single people and childless couples.

7. The town centre, it is suggested, would include two schools, two churches, a community centre, a fire hall, a federal building, a hotel and restaurant, shops, gardens and fountains and roads; but not the R.C.M.P. (Royal Canadian Mounted Police) administration quarters, nor the hospital, the laundry, the service station and the tourist centre. These would all be located on the outside edge of the perimeter road.

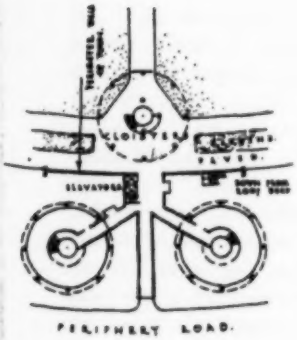
8. The protecting dome is conceived as a thin-shell concrete vaulting, with ribs radiating from a central pier. Clerestory lighting would be achieved at springing level, but without any very large expanses of glass (because of winter heat loss and the long winter darkness). The central column would be surrounded at high level by a restaurant, reached by way of a bridge from the shopping centre's roof and by a stairway in the column. Consideration may also be given to a dome of plastic or aluminum.

9. The planners propose the town should be a pedestrian town, with traffic inside the dome kept to a minimum. They suggest that tundra gardens could be laid out alongside the paved walks connecting the buildings. They suggest basement parking for residents, and possibly the cultivation of green vegatables by hydroponics in another part of the basement area. In presenting their proposal to the committee responsible for Frobisher Bay's development they make a number of other imaginative suggestions--such as small trains of battery-operated electric trolleys running along the inside roads for personal transportation.



FROBISHER BAY, N.W.T.: FEDERAL GOVERNMENT PROJECT FOR A NEW TOWN

The preliminary plans for the new town of Frobisher Bay, which may eventually replace the existing collection of huts and frame houses (above) which presently constitute this centre for the administration of the eastern arctic, are unquestionably the most radical and exciting sign yet in the northern sky. As the article (p. 46) points out, these studies are a very early part of the work which will have to be done in designing for the far north; but even at this stage, they are bound to cause a thorough reconsideration of this whole question. The work has been done by the federal Department of Public Works for a Frobisher Bay development committee which includes senior officials of that development and of the Department of Northern Affairs. Chief Architect: E. A. Gardner; Chief, Preliminary Design Division: W. E. Fancott; plans and perspectives: Verne Ridgeway, A. M. Ross.



KEY TO PLAN (opposite)

1-12 Apartment blocks
13 Fire hall
14 Community hall and club rooms
15 Children's playground
16 Primary school
17 High school skating area
18 High school
19 High school combined gymnasium and auditorium
20 Federal administration offices
21 Hotel
22 Restaurant
23 R.C.M.P. guard post
24 Church and bell tower
25 Funeral parlour
26 Department store (clothes)
27 Department store (food)
28 Post office
29 Banks and stores
30 Parks (with gardens and trees)
31 Fountain
32 Cloisters (with tundra garden)
33 Radio station in community hall
34 Entrance and exit to basement
35 Central tower to dome (stairs and restaurant)
36 Federal liquor store
37 R.C.M.P. administration
38 R.C.M.P. living quarters
39 Laundry
40 Hospital
41 Hospital staff living quarters
42 Rehabilitation centre
43 Tourist centre
44 Service station, taxis, repairs
45 Periphery communication road

In Basement:
Storage and warehouses, maintenance workshops, vehicle parking, swimming pool, curling rink, heating and mechanical plant rooms.

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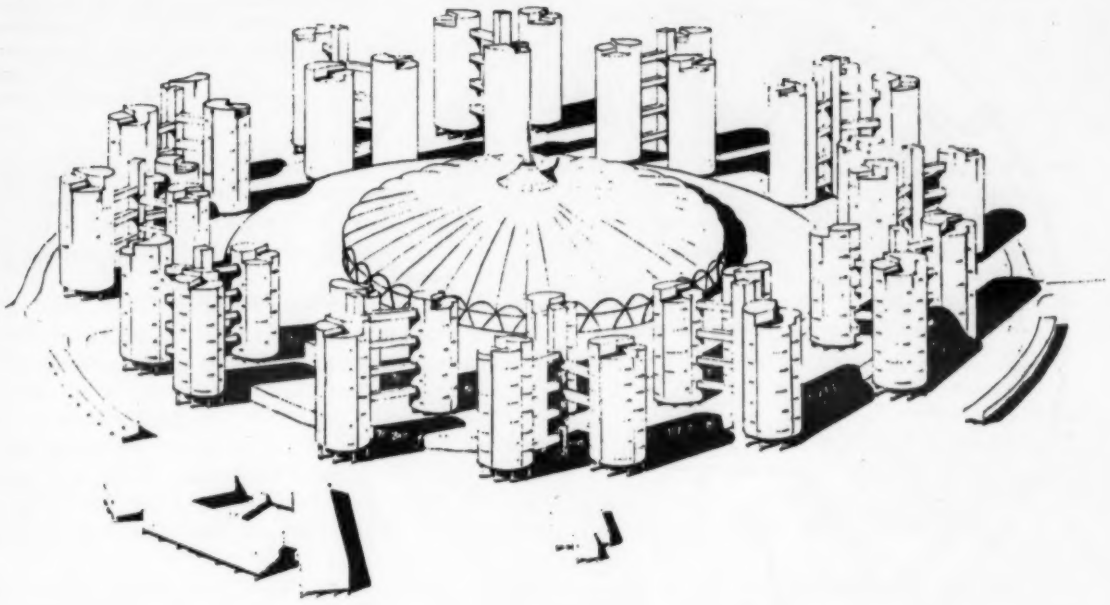
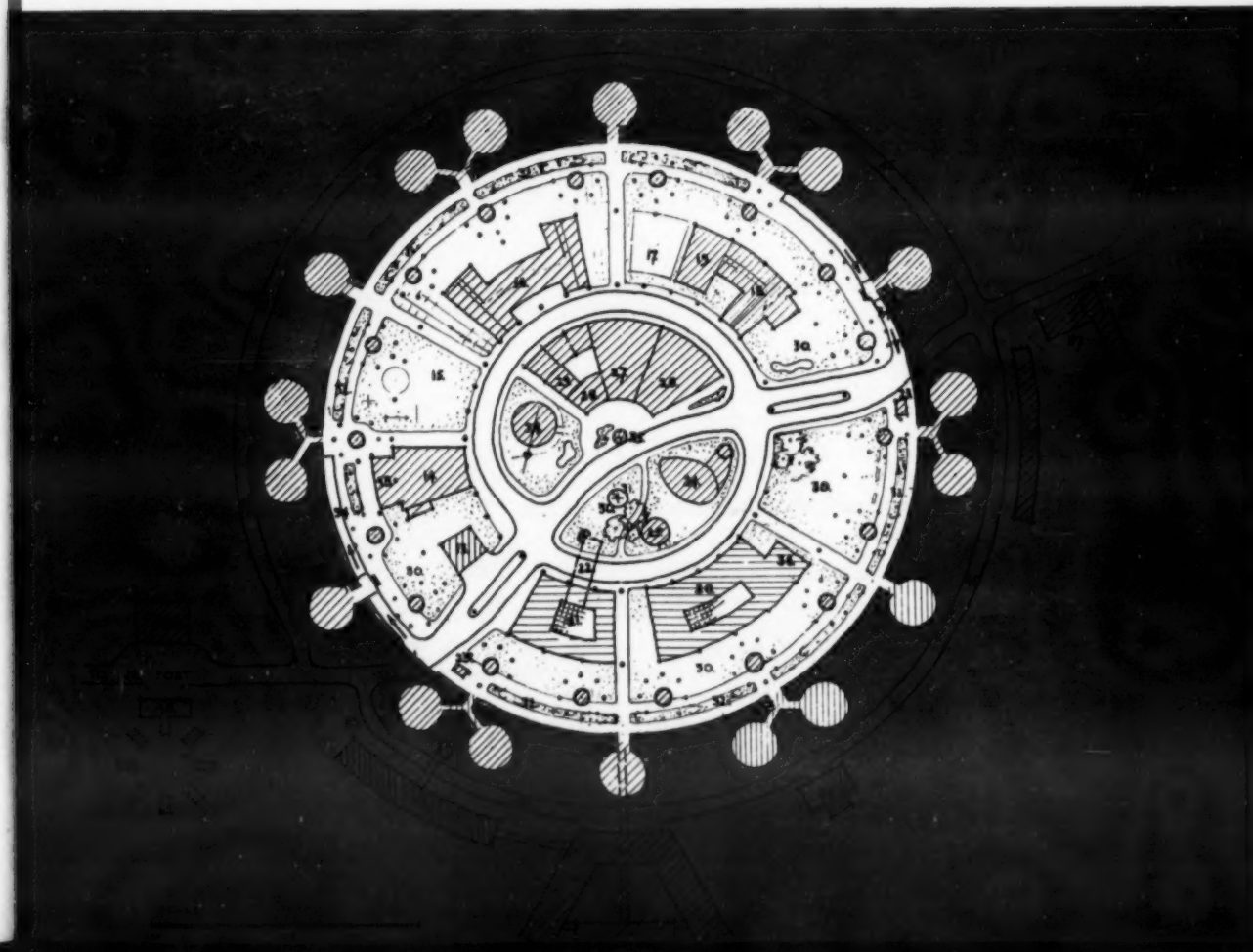
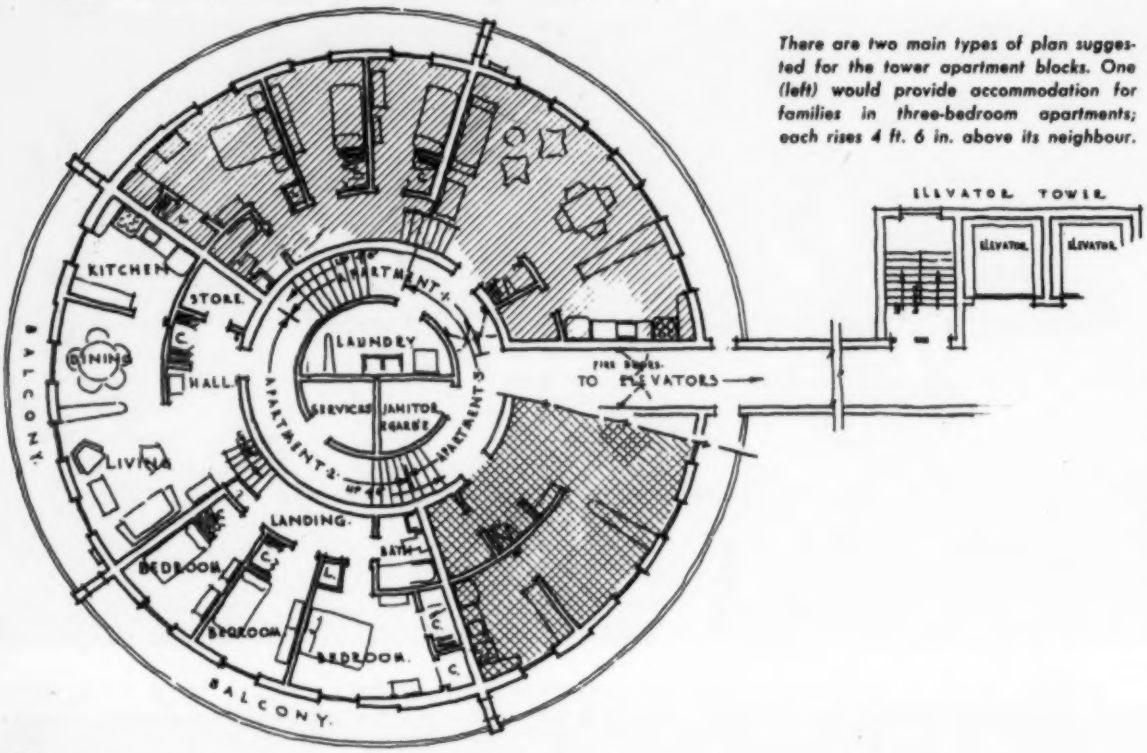
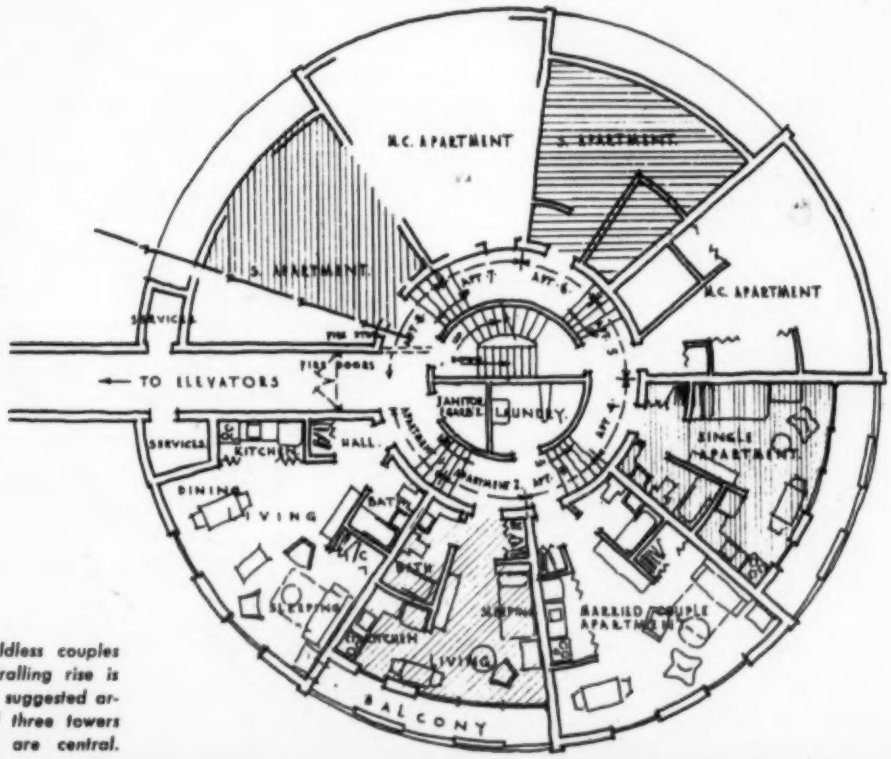






There are two main types of plan suggested for the tower apartment blocks. One (left) would provide accommodation for families in three-bedroom apartments; each rises 4 ft. 6 in. above its neighbour.



The other type is for childless couples and single people; the spiralling rise is here smaller. There are two suggested arrangements of a group of three towers (left). Elevators for three are central.

J.O.

Rother Bland Trudeau, Architects
SHELTER BAY (PORT CARTIER): PROJECT FOR A NEW MINING TOWN ON THE ST. LAWRENCE RIVER
The Canadian Architect, November 1958, pp. 50-53.
711.45 (71)

1. Port Cartier is being planned as a private mining town on the north shore of the St. Lawrence River near its mouth. It will be located at the site of the present settlement of Shelter Bay. The Quebec Cartier Mining Co. has commissioned Architects Rother Bland Trudeau of Montreal to design the town.

2. At the townsite two rivers come down through the forest, forming big, rocky islands, waterfalls and rapids before meeting the sea. These rivers, the Rocher and the Dominique, are the active elements in the landscape. The site is a protected half saucer of land east of the Dominique River and open to the southwest. It has a great stretch of sandy beach along the St. Lawrence. The site is otherwise fairly densely wooded. There are trees and beautiful small plants over the whole of the area and it is hoped that, if fairly large stands of natural growth can be left undisturbed, the town can have a rich landscape and not be the bleak horror most northern towns tend to be.

3. The plan indicates a pattern of houses the architects consider suited to this sort of terrain. The main drives follow the contours, providing rings of communication through the town. No houses front upon them but, between the drives, small streets are extended to provide access to the houses and particularly their garages, which are close to the streets for easy access in snowy conditions.

4. The houses are closely grouped side by side for the savings which such an arrangement offers, but their individual sense of space, outlook and privacy is assured by a wider separation across an open space where there is footpath system of communications between houses and other buildings in the town.

5. The individual houses are planned over the parts of the town-site where there is a sufficient depth of soil to have normally trenched services and basements. But where the rock is at the surface, row houses have been planned to be built without basements and, as far as possible, to have their services running below them to minimize the amount of rock excavation.

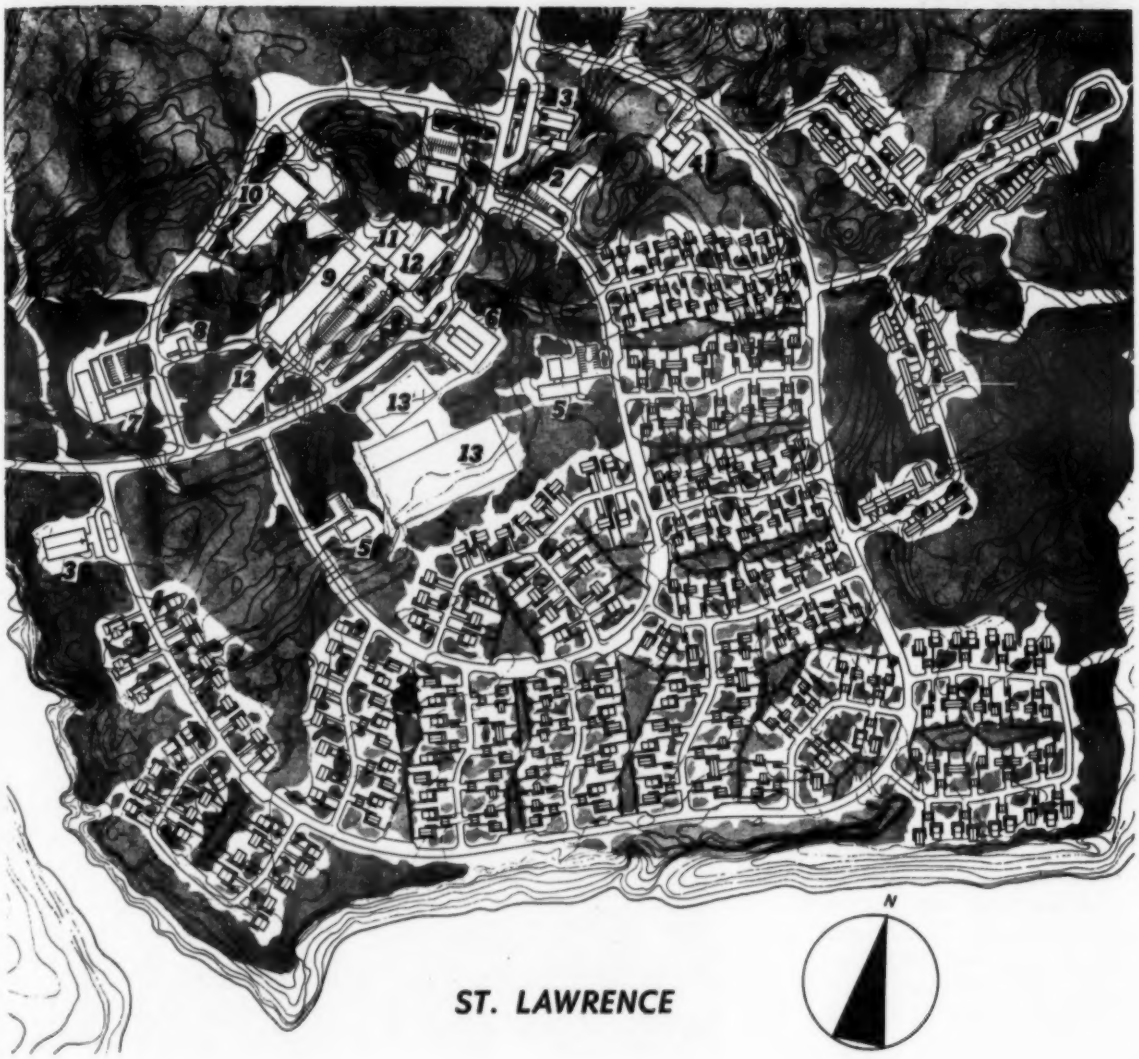
6. In the centre of the town there is an open space and playground, sites for the schools, and the community centre. Above this open space, a central shopping area is planned. It will contain the hotel, recreation building and probably a cinema. A little further to the east, there will be a church and the priest's house--below is the hospital and the single men's staff house.

7. The town will grow at first to the north to surround the central area, and then it will grow to the east--probably as far as the railway. Its ultimate size is unknown; it could be from 5,000 to 15,000 or even more. It is not possible to make a precise plan for such a contingency, but there is space for growth. Presumably such a growth would necessitate additional local shopping places. The port area is eastward and growth in that direction seems obvious.

8. There is a general plan for the new combined municipal area of Port Cartier and Shelter Bay which covers a very great area to prevent squatters. It has two residential sections, divided by the two rivers--the two company townsites, both of which will grow. The pulpwood operations of the Quebec North Shore Paper Co. will continue on the Rocher River. Islands will become park spaces.

9. The railway cuts across the municipal area from the west and forms a division between the industrial and residential sections. The area north of the provincial highway (which parallels the shore of the St. Lawrence) is intended to be reserved for the time being. The airport will be there, but no houses or industrial activities are contemplated for some time.

10. Exploiting the natural landscape and replacing it where it has been destroyed by construction activities, is a general principle of the landscape plan. The actual treatment will be based upon zones of urban intensity, from the central area to the wild untouched woods on the fringe of the settlement. Paving, cut grass and flowers will occur in the centre and extend out along the drive and wherever public or quasi-public buildings occur, and gradually merge with the natural growth.



Above: a detailed plan of the new townsite. Running down into the St. Lawrence at the left corner is the Dominique River: part of the wooded area between Port Cartier and the old Shelter Bay is shown west of the Dominique. The main road through town swings round in the top left corner, in which direction new housing will ultimately come too.

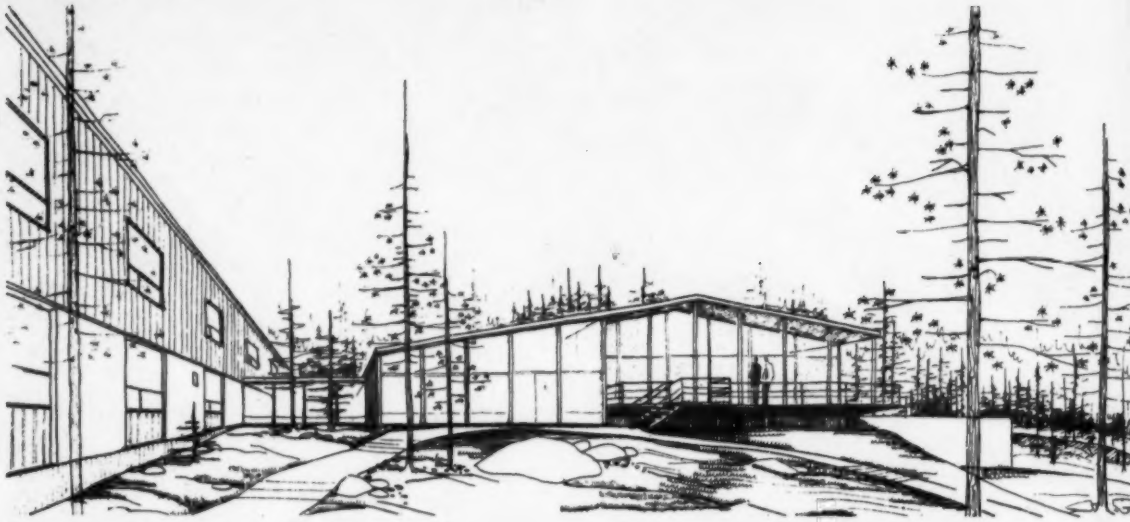
Shown on the plan are 1 the municipal offices; 2 hospital; 3 church; 4 men's quarters; 5 school; 6 community centre; 7 hotel; 8 service station; 9 shops; 10 recreation centre; 11 cinema; 12 future shops; 13 playing field.

The basic principles of siting and landscaping follow those of the firm's housing project for Atomic Energy of Canada Ltd. at Deep River, Ont.; in fact, the photographs on the opposite page were taken there, though they perfectly illustrate what is proposed for Port Cartier. Trees are retained wherever possible and, as the architects hope, even small plants can be kept where they are to give the town a more beautiful and less bleak character.

Many of the buildings are not yet designed (some of the drawings used in this presentation are dated this month). One that is complete is the staff house shown in the rendering at the top of the opposite page.

The Canadian Architect, November, 1958.

SHELTER BAY



Above: proposed staff house. The two-storey block (left) has a full basement; the low block is built on grade.

Right: photographs of two house groups in the architects' Deep River project, giving a good idea of the character proposed for housing in Port Cartier.

J.O.

Pearson, Norman
ELLIOT LAKE: "THE BEST-PLANNED MINING TOWN"
The Canadian Architect, November 1958, pp. 55-61. Illustrations.
711.45 (71)

1. This is the analysis of the success of a Canadian Uranium mining town, and its significance for the future and development of mining towns.

2. Elliot Lake is hill town, and it is first brought to the attention of the motorist by the water tower perched ona hill above the town centre. Unlike hill towns of Italy or northern Europe, Elliot Lake is a low-density town, dominated by the motor car and full of houses which could be found in any sub-division in any city across Canada. Whereas older hill towns had their cathedral or fortress in a prominent location, here the community auditorium and the water tower stand out on the skyline, and the gleaming white structures of the mines on the surrounding hills appear insistently. Everywhere within the town, lakes can be seen reflecting the ever present spiky trees.

3. Elliot Lake is a mining town; but it is surely unlike other mining towns. Uranium, the source of atomic energy changed this uninhabited and romantic area to one boasting a whole new town, almost finished, and a cosmopolitan population which appears to have a sense of community and a pride in the achievements of three years of fierce construction. The number of planned mining towns in Canada is increasing rapidly. The common history of most such mining areas is one of spoiled countryside and shack towns, more camps than towns. But now has come the realisation that these places can be towns, and the challenge has been accepted.

4. The story of Elliot Lake is typical of the dramatic intensity of growth in almost all Canadian communities since the end of World War II, heightened by the difficulties of development in the northern lands of lake and woods. It is in scale and in speed not at all unlike the way suburbs or special communities like Kitimat, Don Mills, Ajax and Gagetown sprang into being. European settlements of equivalent size created in the past two decades are almost all superior in their planning and especially in the quality of their architectural control.

5. But Elliot Lake is not a completely isolated company town like Kitimat, nor a special army town like Gagetown-Oromocto; nor is it a metropolitan community like Don Mills. It was a chance for the official planning agencies in the province to apply the experience of ten years of urbanization. European new towns are perhaps better because more time was spent on their concepts and on the details of controlled design. It may be also that their legislation or techniques were better. However, perhaps the pace of development imposes a rather different approach, demanding more attention to the general concepts of urban development to suit the special characteristics of the regions (their climate, topography, personality and vital social questions) and a good deal more thinking "from the site" than is normally evident. It is better to compare Elliot Lake with normal Canadian suburbia or the other boom towns--for it is certainly not a Vallingby or a Harlow.

Pearson, Norman. Elliot Lake: the best-planned mining town --2

6. Some areas of the town are obviously only the typical Ontario subdivision transported to the north country. But one sees a definite and steady progression in the fact that the older parts of this town are inferior to the recent additions. Here and there, perhaps by intent and perhaps by accident, there are beautiful and striking pieces of townscape, signs that the forceful vigour of the site and the efforts of site planners were well interpreted by a group of uncoordinated developers. It is clear to anyone examining Elliot Lake that, without the unusual site, this might have been only an exceptionally neat and trim standard suburb, with a few pleasant features and a general air of efficiency. But because this is a difficult site, the town has already a personality and a distinct character.

7. Perhaps another lesson can be drawn from the history of Elliot Lake: it is that official attitudes to planning very often lag behind those of the pioneer developers. An early view was that one team should design the whole town, and there was confidence that the result would be distinct and unique. The "official planners" were able only to produce a layout and then watch while opportunities were missed, and this despite control of land and good legislation. They have avoided the hideous mess of the usual boom town and they have prevented ribbon development and trailer camp accretions. That they have been unable to do more may be a matter of defects in policy rather than failure of technique. There is still need for a skilled team with adequate powers and controls, and government has not yet a core of planners and allied experts able to think of the principle which should be applied.

8. What policy <u>should</u> apply in such an area? The streets in Elliot Lake are wide: probably too wide for the cold winters. The house types are conventional, and despite some ingenuity in their siting and spacing, particularly evident on the sloping and curving streets where the fall has been sensibly used (so that each house has a reasonable outlook and usable lot), they should have been properly designed for the specific site and location. All of the underground services, trees at the rear of lots, church and local commercial areas, are well done and competently handled. But the houses are anonymous for the most part, and the skylines are too often pimply where they should show sympathy with natural forms or be in contrast to them.

9. The present town is an entity. It works as a town and it is a reasonable unit, given the pressure for development and the unusual topography. But a mile and half away is the western townsite, separated by an intended special recreation area. Was this the right decision" The whole policy behind building new towns in mining areas is surely to provide all the urban amenities and better living standards which become possible when one is given higher concentrations of people. It is very reasonable that this population should commute to the mines (which are often ten or fifteen miles away); but is it reasonable to expect two separated sites to form one town, and to rely on the car (and the bus) to tie them together? It may be the right social philosophy to join the two town sites by a special recreational area instead of a central core of buildings; but when the western site is opened, and the population increases from 14,000 to 29,000, spread over 5,000 acres, will this be an entity or two separate areas?

Pearson, Norman. Elliot Lake: the best-planned mining town --3

10. What alternative is possible: This is where Vallingby and Harlow are relevant. The low densities, wide streets, conventional houses, low central buildings of this town (successful as they are) are really not the answer to urban growth in such a setting. Would it have been possible to prevent the central area being dominated by three huge car parks round which buildings lie, and round which people struggle with baby buggies up flights of steps and narrow ramps? The car has given us the chance to separate work and town sites: are we losing the advantages of centrality? The town is not very different from the sites used with such success by the Swedes for their point blocks and row housing. The area which is most successful in this town is the section near the community auditorium, where that building, with the school and several apartment slabs and row housing, form a fine grouping that responds to the characteristics and vitality of the site. The sections which are least successful are the areas of single family housing, where the fine views of the lake which they enjoy is balanced by the prickly skylines and the restlessness of small boxes with masts which everyone else sees.

11. These problems will become all the more evident when the western town site is fully developed. The answer might have been to accept the challenge of climate and topography in a different way--to built a higher density. The greater part of the town was to be single family dwellings, with only about 12% in multiple family dwellings. The result in Elliot Lake may be compared with Peterlee, County Durham, England, where a good design (by Lubetkin) was discarded for a more conventional spread out plan--only to be followed by a resulting need for a newly designed higher density section.

12. Would it not have been possible to design a series of suitable house types specifically for this site and these people? Would it not have been possible to build at higher densities in order to make better use of expensive services? Cars could have been put under houses, walls arranged to prevent snow drifting and to ameliorate cold winds, houses grouped to give protected and intimate spaces. Boulders on the site, and the craggy outcrops, suggest a scheme where houses could have been placed in the landscape rather than a clearance of great swathes through the woodlands, leaving trees only in the back lots. The single-family lot is not a good unit or module for a new town. The designers of Elliot Lake deserve praise for what they have done with unpromising material and a difficult site, they deserve credit for their ingenuity in finding suitable land for this sort of development; but perhaps they were implementing the wrong sort of concept for a northern town. Speed of development is no excuse. We must learn to live with that, and act accordingly.

13. The town centre: could it not perhaps have been an integrated structure with covered gardens and a real square as a focus? The symbolism of the present town is quite accurate: the great assembly place of the people of Elliot Lake is a collection of vehicles. The streets of the centre are lively and the individual buildings are often attractive, but the crags and trees cry out for some complementary architectural work. Everything is at hand-- a fine landscape, several different levels, surprising views, rocks and boulders, steps, ramps and a dominant position. What kind of city hall is proposed? How will it relate to the rest of the centre? Here is a challenge that a design team (planners, architects, landscape designers, engineers and

ELLIOT LAKE

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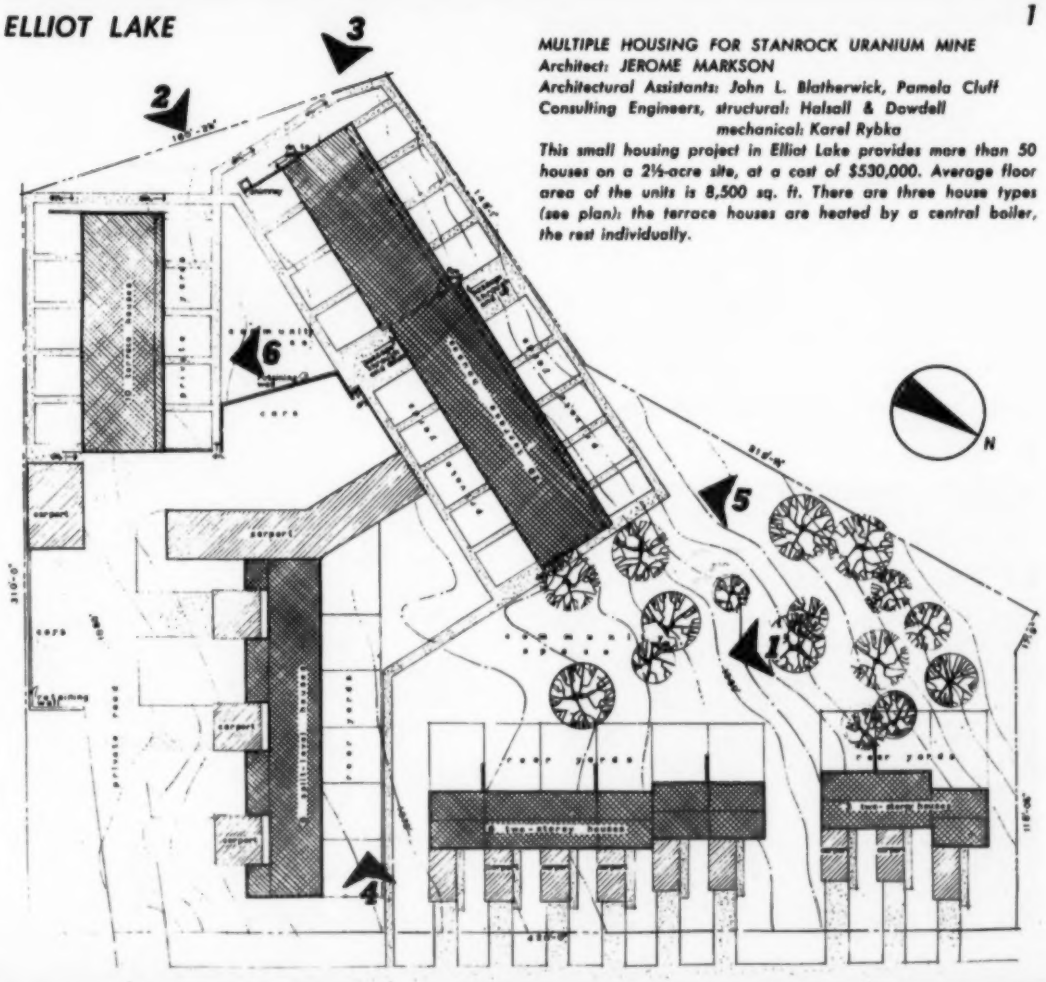
MULTIPLE HOUSING FOR STANROCK URANIUM MINE
Architect: JEROME MARKSON
Architectural Assistants: John L. Blatherwick, Pamela Cluff
Consulting Engineers, structural: Halsall & Dowdell
mechanical: Karel Rybka

This small housing project in Elliot Lake provides more than 50 houses on a 2½-acre site, at a cost of $530,000. Average floor area of the units is 8,500 sq. ft. There are three house types (see plan): the terrace houses are heated by a central boiler, the rest individually.



sociologists) might well have accepted; even in relative haste, they might have created something distinctive.

14. The defects of Elliot Lake: lack of coordinated attack on development problems, the absence of adequate concepts or urban form and development (planning without a plan), inability to produce really satisfying architectural solutions in areas of rapid development, lack of respect for the climate and personality of particular landscapes, lack of response to the challenge of urgent growth, and inability to cope with the motor car (which obliterates by its mass presence the very convenience it was created to produce)-- these are also shortcomings of planning in a wider sense. We have not yet learned that cities are for people, not for cars; production is for society, not vice versa.

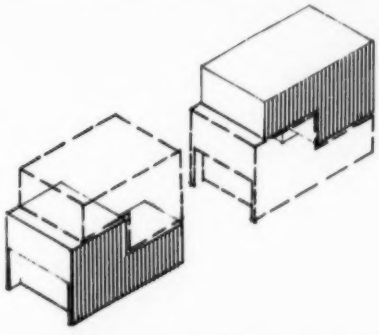
The Canadian Architect, November, 1958.

5

ELLIOT LAKE

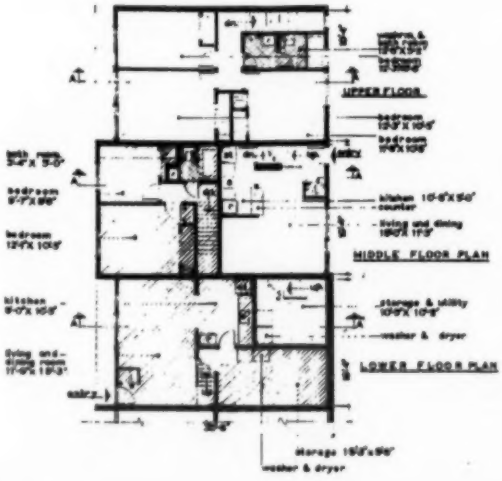
The larger row of terrace houses is seen in picture above.

SECTION A-A



Below: terrace detail. Section, plan, perspective also shown.

6



CONSTRUCTION

B.E.F.N.S.

Whiteley, P.
ROOF PAINTING PROBLEMS IN TROPICAL CLIMATES
Great Britain, Department of Scientific and Industrial Research, Overseas Building Notes, No. 55, October, 1958.
69.024 :667.637.2 (213)

1. The present article is based on notes by Mr. Whitley, who became Tropical Paint Research Fellow attached to the Colonial Liaison Section, Building Research Station in March 1957. He has worked since that time in close collaboration with the Paint Research Station, Teddington as well as with the Crown Agents for Overseas Governments and Administrations. He made a three-month tour of Africa in late 1957 and has prepared the following notes as a result of his observations.

2. In many places overseas, roofs have proved one of the major painting problems, because they are obviously the part of the building most exposed to the weather, and also because the materials used are themselves often difficult to paint. Very often the material is a metal sheet which needs paint mainly for protection. There are other reasons for painting. Light-coloured surfaces help to keep a building cool in a sunny climate. Bright metal coverings can glitter unpleasantly in the sun, and may need to be painted. The periodic repainting of metal and asbestos-cement roofs - and the colour-washing of materials like the coral-rock slates used in Bermuda - does much to improve the appearance of buildings which, if not cared for, soon look drab and dirty in a tropical climate.

3. The practice of painting roofs is quite widespread overseas, and there is so much dissatisfaction with present paint performance, that the subject merits special attention. Various kinds of roofing are discussed with reference to the problems involved in painting them.

Corrugated Iron

4. New galvanised steel sheet has a smooth surface with a film of grease or oil which makes painting difficult and impairs the adhesion of the paint. In addition, the zinc used for galvanising may react with some of the products formed during the drying of linseed oil, leading to embrittlement and lack of adhesion of the paint. Although the zinc gives very good protection to the steel, it can corrode slowly -- especially near to the coast, -- so that the total life of the sheet is greatly increased by successful painting.

5. The usual way of providing a key for paint is to allow a period of several months weathering before painting, which causes the oil film to be washed off and the surface roughened. (Even this sometimes fails to give the desired results, and the process is slow in dry climates.) During this period, the roof presents an unfinished appearance. It is obviously more convenient, as well as improving the building's finished appearance, if the roof can be painted at the same time as the other paint work is in progress. This is frequently attempted without regard to the difficulties. It has been a standard recommendation to etch the surface by means of a mordant wash, various types of which are available. Of these, the ordinary acid wash is often unsuccessful, and has to be carefully rinsed off with plain water to avoid subsequent failure. The copper sulphate type is even less satisfactory and may actually enhance corrosion. Certain proprietary treatments are capable of giving good results if supervision is adequate to ensure correct use according to directions.

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6. These treatments are intended for use when only one coat of paint is to be applied. If it is possible to use an affective primer as described below, or a roof paint known to give adhesion without the mordant wash, an alternative treatment is simply to degrease throughly by swabbing with a solvent, such as white spirit or any paint thinner, or with a strong solution of a household detergent.

7. Roof paints vary widely in composition and performance. It is unfortunate that they are usually regarded as cheap materials not worthy of much attention, since this is the surest way to bad results. The exposure conditions for roofs are the worst possible, even without the added difficulties of the particular surfaces, and the paint should be of a correspondingly high quality. A moderate increase in price may save considerable maintenance costs. The quality of a red roof paint should not be judged solely on its initial brightness of colour, but on its ultimate freedom from flaking. A paint which has failed, after proper preparation, should not be repurchased. To demand a bright rich red of high lightfastness is uneconomic in this type of paint, since such pigments are extremely expensive. A roof paint is intended as a one- (sometimes two) coat finish, direct on the metal surface. It is difficult to combine the protective and adhesive functions of a metal primer with the decorative requirements of a finishing paint, and most roof paints would give much better results on metals if a suitable primer were used.

8. The usual primer for zinc has been the zinc chromate type, but there is a marked difference in performance between different makes. In recent years, calcium plumbate has been found to perform exceptionally well on galvanised surfaces and this would now be the first choice; the high cost should be well repaid in reduction of maintenance. (Calcium plumbate should not, however, be used if the roofs are used to collect drinking water.) Etch primers can also be successfully used, but they have certain limitations which may make them unsuitable for unskilled painting in the tropics. Ordinary red oxide primers are of little value under roof paints.

9. If weathering, or corrosion produced in stacked sheets during or after shipping, has resulted in the loss in part of the zinc protective coating, it is important to prime those areas with an anti-corrosive steel primer. The best in these circumstances would be calcium plumbate primer, preferably used overall, but red-lead may be used for patch priming, and zinc-rich primers, if available, are also suitable.

10. The underside of galvanised roof sheets frequently suffers severe corrosion, because of condensation in the roof space. The correct treatment here is the use of a primer as described, followed by normal decorative paint, or for severe conditions such as kitchens, chlorinated rubber paint may be used.

11. Since reluctance to accept the initial cost of doing the job properly is responsible for the continued use of one-coat roof paints, the South African National Building Research Institute* has been carrying out a research programme to produce a low-cost single coat paint of improved performance. The results show that two of the paints developed are superior to most ordinary commercial paints. The two paints are expected to be marketed by a number of

*P.O. Box 395, Pretoria, S. Africa.

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South African paint firms (whose names are obtainable from the Institute), and a South African bureau of Standards specification is being published to cover the composition and performance requirements.

12. The work concentrated on finding the reasons for the failure of standard types and the avoidance of those materials shown to be reactive towards zinc; thus linseed oil seems especially liable to embrittlement, and although alkyd resins are claimed to be more flexible and durable, most of them contain linseed oil and may fail for this reason. The oil preferred was dehydrated castor oil which, produced from castor oil by chemical treatment, has been given the ability to dry to a solid film in the same manner as other drying oils, and this forms the basis of the first type. A further feature is the omission of lead driers which were found to be harmful in this paint. A high zinc chromate content inhibits corrosion of the steel at breaks in the zinc coating.

13. An even less orthodox approach is the use in the second type of roof paint of an emulsion base. Water thinned paints are usually satisfactory on metals since they may fail to wet the surface or may even increase corrosion, but the acrylic resin emulsion chosen by the National Building Research Institute is reported to have excellent durability. (This particular emulsion is finding use in the U.S.A. in interior and exterior wall paints similar to the better known PVA and polystyrene emulsion paints; it is claimed to be more durable but is more expensive.) The difficulties normally met in using zinc chromate in an aqueous based paint have been overcome and thus the paint has anti-corrosive properties. It adheres well to the zinc after a degreasing treatment such as that mentioned above and application properties are very good, as would be expected from an emulsion coating.

14. Green Roof Paints. Although red - red oxide, or brighter reds which usually fade quickly to the brownish red of the oxide - is the most commonly occurring colour for roof paint, many users would prefer green, but have experienced unsatisfactory durability with it. While the defects of loss of adhesion and flaking which have been under discussion so far are of greater importance, there have been complaints in East Africa and elsewhere that green roof paints turn yellow. This may be attributed to the reaction between the zinc coating and the green pigments commonly used - the 'Brunswick' or 'Chrome' greens. (It is interesting to note that in England the normal colour change of these greens is to turn blue, because the yellow component is converted to a colourless product by reaction with the sulphur dioxide in the acid, industrial atmosphere.)

15. Two ways of overcoming the colour change are possible. More permanent pigments are available, although naturally at higher cost. Of these, chromium oxide is virtually unchanging on exposure; it gives a rather limited range of soft, dull greens. (Note that it is not the same as chrome green.) Certain organic dyestuff pigments of high lightfastness are also available and can be used to produce a wide range of brilliant as well as softer colours. Both types of pigment may be incorporated in any roof paint formulation, but would obviously be wasted in the cheapest qualities.

16. The alternative is to isolate the ordinary roof paint (containing chrome greens) from the metal by means of a first coat of primer, and for this purpose the calcium plumbate is most suitable.

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Aluminium

17. Aluminium is not such a difficult metal to paint as zinc. Degreasing is still necessary and highly polished surfaces should be lightly roughened, preferably with an abrasive powder and not by wire brushing. A number of proprietary treatments for surface preparation are quite effective. An etch-primer is the best priming coat for aluminium; but if not available, and in the absence of experience of its use, a good zinc chromate primer is satisfactory, and provides the necessary corrosion resistance. A primer containing both calcium plumbate and zinc chromate has been proposed, as suitable for both galvanised and aluminium sheets.

18. The performance of single-purpose paints on aluminium is naturally variable but not usually as bad as on zinc, although adhesion failures often occur. Lead paints are normally avoided on aluminium as there is believed to be some risk of stimulating corrosion.

Asbestos Cement

19. For asbestos cement, the object of painting is decoration or the control of algal growth rather than improving durability. Its treatment is therefore different from that of a metal. For many uses, such as internal partitions, asbestos cement is finished with a normal gloss paint, but a coat of alkali-resisting primer must be first applied, since the oil in the paint is liable to be attacked by alkali if the fresh sheets become moist. (After weathering there is much less risk of this happening.) The primer is also useful to even up the variable porosity of the sheets. Roofs can be treated in this way but it is somewhat costly. A good alternative is chlorinated rubber paint which is not attacked by alkali. Two coats are required, the first being well thinned to penetrate the surface. No primer is necessary. Proprietary materials are also available for direct use on asbestos cement. They should be used as directed by the makers; sufficient experience of them is not yet available to make recommendations.

20. Polyvinyl acetate emulsion paint is also usually suitable for direct application to asbestos cement. This is a useful finish indoors and has also been increasingly employed on external walls, but the roof exposure conditions may prove too severe in some climates. Cement paints also may be used on asbestos-cement sheets, but the durability again will not be of a high order on roofs. Self-coloured asbestos-cement sheets are also available; some are pigmented in manufacture, others are chemically coloured on the surface, and the latest types are painted at the factory with chlorinated rubber or other suitable paint. The last type appears to be most satisfactory. Where no colouring is required, but it is desired to avoid the black stains caused by algal growth, a wash with copper sulphate solution (one per cent., i.e. 1.5 ounces to a gallon of water) is effective. The treatment has to be repeated at yearly intervals.

Unprotected Concrete Roofs

21. A reduction in the absorption of solar heat by these roofs may be obtained by painting them white (or, less effectively, with aluminium paint). On weathered concrete, as long as the surface is not too dusty, little difficulty

will be experienced. Fresh concrete is liable to attack most gloss finishes based on drying oils or alkyd resins, and chlorinated rubber paint is preferable for both fresh and weathered concrete. It should not be applied while there is still any appreciable amount of moisture in the concrete, since being impermeable, there is a risk that it will be lifted by the trapped moisture. Even the humble limewash is useful on concrete purely as a reflective coating; cement paint or emulsion paint will prove somewhat more permanent.

Bitument Felts

22. Although extremely waterproof, bitumen is fairly readily oxidised, especially when exposed to light. It is therefore useful to protect it from direct exposure, and painting is also often required to increase the reflectivity of the dark surface. Bitumen, however hard it appears in the normal state, is in fact an extremely viscous liquid and a bitumen surface (unless so old and weathered that it has oxidised to a brittle solid condition) behaves as such under the solid films formed by oil paints, which are unable to accommodate its movements and quickly develop large cracks. Bitumen will also bleed through most oil-based paints and quickly spoil the colour.

23. There are aluminium sealers available which may permit the use of a white finishing paint on top. Bituminous felts may contain free bitumen at the surface which causes most paints to crack. Some reduction in internal temperature under bitumen felt roofs may be obtained by painting with a bituminous aluminium paint but the reflectivity of such paints is not high. Lime-tallow washes are cheap and have high reflectivity but are short lived.

24. A more effective method would be the use of either mineral-treated bituminous felt sheets or a liberal dressing of sand or white stone chippings using a bitumen solution as adhesive, followed by a coating of lime-tallow wash or of an emulsion paint suitable for exterior use. Both the lime-wash and emulsion paint may be used directly on bituminous surfaces but the adhesion is generally poor and the former requires frequent renewal. The emulsion paint will have a far longer life when in contact with sand or stone than when applied to the bituminous surface itself. Chlorinated rubber paints should not be used on bituminous felt or bitumen-coated surfaces.

Previously Painted Roofs

25. In rare cases where intact paint is to be repainted, a good wash down followed by a coat of roof paint is adequate treatment. But roofs are generally repainted because the existing paint is cracked or flaking; in this case there is no substitute for complete removal of the paint, and dry scraping will usually suffice. Any paint patches apparently adhering may fail under the contraction stress of a fresh coat and must be completely removed. Caustic paint removers are not advisable on zinc, aluminium or asbestos cement, and solvent paint removers would be expensive and difficult to use on roofs. Burning off would only be possible on metal, and then only if this is normal practice in the area, and can be entrusted to the labour available. Subsequent painting should be by the appropriate system as already described.

Great Britain, Department of Scientific and Industrial Research, Overseas Building Notes, No. 55, October, 1958.

SUMMARY TABLE OF RECOMMENDATIONS

Roof Surface	Treatment	Primer	Finish
Galvanised Sheet	Degrease, roughen or weather	Calcium plumbate, or Zinc chromate	1 or 2 cts. Exterior Gloss Finish, or 1 or 2 cts. Roof Paint (Good quality)
	(Lower cost) Degrease, roughen or weather	Red oxide, or none	1 or 2 cts. Roof Paint
	(Lower cost) Degrease	-	1 ct. National Building Research Institute Roof Paint if obtainable
(Painted and flaking)	Remove paint by scraping (or burning off)	Calcium plumbate, or Zinc chromate	Undercoat & Exterior Gloss Finish, or Roof Paint
Aluminium	Degrease and roughen by scouring or proprietary treatment	Etch primer	2 cts. Exterior Gloss Finish
		Zinc chromate	1 or 2 cts. Exterior Gloss Finish, or Roof Paint
Asbestos Cement	Brush off loose dust, algae or loose paint	-	2 cts. Chlorinated Rubber Paint (1st Thin)
	1% Copper Sulphate wash if algal growth is present or liable to occur	Alkali resisting primer	Undercoat and Exterior Gloss Finish
		-	Proprietary paints for asbestos cement, or PVA Emulsion Paint
Concrete	Weather. Brush off all loose powder	-	Chlorinated Rubber Paint
		Alkali resisting primer	2 cts. Exterior Gloss Finish, Cement Paint, PVA, or limewash
Bituminous Surfaces, Bitumen Felts, Bitumen-Coated Steel Sheet	-	(Aluminium Paint, or Bituminous Aluminium Paint)	Aluminium Paint, or Bituminous Aluminium Paint
(Sticky)	Blind with white sand or stone chippings	-	PVA Emulsion Paint, Cement Paint, or limewash
(Sand or mineral coated)	-	-	PVA Emulsion Paint, Cement Paint, or limewash
(Old and cracked)	(Little chance of success) Recoat with hot or cold bitumen, blind with sand or stone chippings	-	PVA Emulsion Paint, Cement Paint, or limewash

GENERAL

Biesheuvel, S.
PSYCHOLOGICAL ASPECTS OF LIFE IN A WARM CLIMATE
South African Architectural Record, October, 1958, pp. 31-37
1 : 711.1 (213)

1. This article is one of a series which were presented at a symposium on "Design for Tropical Living" at Durban, South Africa during October, 1958. (See HIB-GA 39). Dr. Biesheuvel is Director of the National Institute for Personnel Research, Council for Scientific and Industrial Research, South Africa.

2. Many writers have seen a relation between climatic factors and human mental and social activity. Arnold Toynbee saw climate as an initial stimulus to migration and to the development of crafts in new environments. Ellsworth Huntington and S.F. Markham went much farther than this, showing climatic influence on the development of classic and renaissance European cultures — where the "artificial climate" of the heated house becomes relevant. C.E. Mills saw climate as having a determinant affect on both the physiological and psychological development of humans even today.

3. While the speculations of these authors are often supported by statistic and are generally in agreement with everyday impressions, they are far too broad for strict scientific substantiation. The evidence on climate and mortality rates are well grounded. But climate's relation to less concrete categories (productivity, intellectual capacity, cultural achievement) are more tenuous. Also there is a tendency of writers to confuse association and causation when relating climate and other factors. In other cases what are multi-factor elements in reality are sometimes treated as simple causes.

4. Could climate alone be responsible for peaks in the incidence of mental diseases, suicide and sexual offences which Huntington has observed during May and June in many countries? Probably several non-climatic factors are at work here too. One of Mills' hypotheses was that certain metabolic diseases were related to climate. But research has shown that such disease relate better to underlying social and economic characteristics of people. There are also some errors of fact--such as Huntington's characterization of South Africa as having everywhere a worse climate than England or North America. Combined with superficiality of statistical treatment and errors in deductive reasoning, incorrect data leave much of the writing on climate and habitat in need of careful scrutiny. Theoretical bias has a way of influencing the way facts on this subject are presented.

5. The complexity of the situations makes the identification of operative factors very difficult. Errors are likely to occur when reactions to climate are not considered in terms of the adjustments which people make to their habitat as a whole.

6. It is true that climate influences nutrition and disease, through the food that can be grown or the parasites and infections that will thrive in particular areas, and this would seem to call for a broad definition of climatic effects. But methodology requires that investigations be restricted to the primary causes, including barometric conditions, temperature, and humidity levels together with their seasonal variations. An attempt is made

here to isolate the specific contributions made by temperature, humidity, wind velocity and the magnitude of diurnal and seasonal variations in respect to these factors.

Hot Weather Fatigue

7. One of the most frequently mentioned effects of life in a hot climate is a state of nervous debility which has been called "tropical neurasthenia," "tropical fatigue" or "hot climate fatigue." The most generally mentioned symptoms are lassitude, mental retardation, impairment of memory and of concentration, apathy, mild personality changes involving slackness, reduced sense of responsibility, irritability, conscious anxiety, tension and a state of suspiciousness or sense of grievance amounting at times to a paranoid outlook. But climate seems to be only one of the factors of life in the tropics which bring about these conditions. Constant experience of irritation and tension, leads to a mild anxiety state in those already predisposed toward neurotic reactions. Climate as such plays only an aggravating role in this sequence of events. A major cause may be mental conflict due to exile from one's own group to a generally hostile environment, without adequate outlet for the resulting emotional tension. It is noted that missionaries, with less relief than most officials, often work for years in the tropics without any adverse psychological effects. If this is true, then positive motivation, high morale and mental discipline should prove adequate safeguards against psychological disturbances in the tropics.

8. Somewhat similar results have come from recent studies of British military personnel serving in the South Pacific and in southern Asia. (Both land-based and naval personnel on ships were studied).

9. "From these and other military studies, it would appear that climatic factors are responsible for part of the psychological deterioration--in the form of reduced efficiency, lethargy and personality changes--observed in hot climates and that they also aggravate the nervous fatigue resulting from separation, anxiety and incompatibility with the habitat as a whole. What proportion of the resulting fatigue state was due to climate per se, and what proportion to other causes could not be decided with certainty. It is clear also that a positive and agressive attitude can greatly diminish the disability engendered by life in a hot climate."

10. One can eliminate the attitudinal factors of the temporary sojourn in the tropics by studying the influence of meteorological conditions on acclimatized European communities permanently settled in hot areas. But tropical diseases, original quality of immigrant stock, state of development of the community, the occupational role of the average settler, competition from indigenous population or other immigrants, intermarriage with later groups and retention of cultural identity would all have to be considered.

11. The longest history of European settlement is to be found in the West Indies, but many variables seem to have contributed to the deterioration of settlements there. There is a newer settlement in the Australian wet tropics which has so far proved successful. Located in Northern and Eastern Queensland, this area has been shown by scientific studies to have had no adverse effects on its settler population. Both vital and social statistics of the

residents compare favourably with those of Australia as a whole. The intelligence level of children has not been lowered by life in this hot-humid climate, and it was found that European peoples could perform any kind of work necessary. Moreover, it was found that those who performed the most strenuous physical tasks were the most healthy in this climate. Several students have cautioned that not enough generations have passed for any final conclusions to be made about possible physical decline in this area of settlement.

12. An approach to the problem which has hardly been tried is the assessment of the long-term effects of climate on human behaviour in the indigenous races of the tropics. Such studies could determine whether or not the indigenous peoples have acclimated to the point where they are actually psychiologically capable of being as active or more active than other races in the hot climate. It could also indicate whether the development in indigenous races of a slower tempo of behaviour and a less intense activity drive is the main feature of their adaptation to their climate. It will be necessary here to separate genetic effects from those of culture, tropical diseases and malnutrition.

Climate and Work Performance

13. Work performance seems to be more straightforward that the overall relationship between climate and human effectiveness in tropical areas, but there are several difficulties in investigating this relationship too. First, one must find a standard and objective unit in terms of which productivity or work output can be measured and which is suitable for comparative purposes. Variations in output can be attributed to many factors, and it is hard to isolate the effect of climate among these. A study by Huntington on these factors is found to be methodologically unsound and statistically unreliable. But no better researches can be suggested, as experimental design in this area of research is very difficult--and if one tries to study the influence of climate as such by comparing work performance in factories in different geographic areas, employing different labour forces, it is even more difficult.

14. To test the effect of seasonal temperature change, one study applied intelligence, educational achievement and memory tests to about 1,000 school children in the cities of Toowoomba and Townsville, Queensland Australia. The former has warm summers and very cool, dry winters; the latter has hot, humid summers and warm-dry winters. No substantial differences were found either between summer and winter performances or between the two cities. It would be wrong to conclued from these results that temperature have no effect on intellectual alertness and achievement, but it would seem to follow that the climatic effect does not occur in the intellectual sphere per se (in the form of retardation or deterioriation) but in that of temperament, personality or character (in the from of capacity for sustained effort). More, better controlled research is needed.

Research in the Climate Chamber

15. Many of the difficulties of experimental control can be eliminated when research is conducted in a "hotroom" or climate chamber; but this approach is limited by the fact that although some acclimatisation can be achieved by having subjects in the hotroom for a number of hours each day, it is of a different order from that which takes place when one lives continuously in a

hot climate. Hence, the long-term psychological effects of continuous exposure, which are likely to be the most significant, cannot be investigated. Nor can the effects of seasonal changes and of day-to-day fluctuations be studied.

16. Because tasks and test-situations are artificial, motivation is also likely to be different from what it is in real-life situations; and motivation and attitude are prominently involved in human responses to climatic circumstance. The climate chamber does, however, lend itself well to studies of the critical atmospheric conditions at which behavioural functions begin to be affected, of their differential influence on various aspects of behaviour, and of the manner in which effects run their course.

17. In one study, naval personnel were subjected to a variety of tests in the Cambridge hotroom. The tests consisted of a simple visual vigilance task (clock test); a routine physical task involving the raising of a weight through a certain distance by flexing of the arm to the sound of a metronome (pull test); and intermittent heavy physical task, involving at the same time accurate muscular control (heavy pursuitmeter); a routine high-speed mental task, consisting of the writing down of messages received in morse code (W.T. reception test) and an intellectual task involving some moderately hard thinking, again at speed. The tasks were performed at various temperatures ranging from Effective Temperature of 61°F to 97°F. Significant deterioration, measured as errors or failure to perform at a particular standard, occured at an effective room temperature of 83° - 87.5° regardless of the nature of the task. The critical point was about 5° lower when the experiment started from an effective temperature of 61° than when it started at 79°. Deterioration does not abruptly begin at a specific point, however, for a continuous relationship between atmospheric condition and work performance was found.

18. The W/T reception test, the heavy pursuitmeter and the intellectual task all demand quickness and accuracy or response to a rapid succession of signals. This has been called "speed stress." Mackworth, the experimentor in this study, believes that this speed stress is especially susceptible to adverse conditions. Very highly skilled men did not suffer as great a loss in accuracy of performance as did their less skilled fellows, because they required less effort to deal with their task. When the output of the Pull test was raised to a much higher level, by the use of strong incentives (such as knowledge of results, rivalry and encouragement) significant deterioration was found to occur at the same critical temperature, to be proportional to the initial output level in both cases--and therefore much greater in absolute amount when the incentive was high. It was therefore the best men, who put the greatest effort into their work, who deteriorated most.

19. The implications of these findings for work efficiency in a tropical climate are important. Unless work is performed at a more leisurely tempo than is customary in the temperate zone, it will impose stress which will cause deterioration in quality of performance. This will occur particularly in tasks which involve the rapid and accurate assimilation of incoming information, in response to which prompt and appropriate action has to be taken. It would appear, therefore, that when speed stress is an intrinsic and unavoidable feature of a task -- and this applies to much of the administrative, executive and technical work in Western societies -- efficiency can only be

maintained and breakdown prevented by the extensive use of air conditioning as soon as atmospheric conditions become adverse.

The Comfort Zone

20. The concept of the Indoor Comfort Zone was originally developed to meet the needs of air conditioning engineers. But it has been found important to the study of the effects of climate on human behaviour.

21. The comfort zone is measured in terms of effective temperature, a scale which combines wet bulb, dry bulb and air movement readings into lines of equal comfort and which can be more precisely defined as an index of the degree of warmth which a person will experience for all combinations of temperature, humidity and air movement. The Indoor Comfort Zone is that range of effective temperatures (equivalent conditions of temperature, humidity and air movement) within which 50% of a representative group of people feel comfortable when normally clothed and occupied with light sedentary tasks. It is essentially a psychological concept, since it is based on subjective judgements of comfort or discomfort in response to atmospheric conditions. This subjective awareness is in turn dependent on the physiological and physical effects of heat exchange between the body and its surroundings. In thus taking account of the psychological and physiological and physical aspects of man's response to atmospheric conditions, the comfort zone goes to the very core of the problem of the effects of climate on human behaviour. Shortcomings are that it deals only with indoor conditions and does not touch on the influence of seasonal or day-to-day variations. The comfort zone can be very accurately measured.

22. Although it is customary for the comfort zone to refer to the reactions of people at rest or engaged in light activities, there is no reason why it should not be separately determined for various types of work. It could then be used to indicate at what point on the effective temperature scale any particular task or type of work begins to impose stress on the individual performing it.

23. The comfort zone is liable to several acclimatisation effects: an immediat effect produced by moving from indoors to outdoors, of from one room to another at different temperature; a gradual seasonal effect; and a relatively permanent effect produced by prolonged journey in a particular geographic area. The last named varies according to the prevalent temperatures and humidities and the living habits of the people. There is no evidence that the heat regulation mechanisms function differently in different races.

24. There are several implications of these findings. If we know to what extent the climate in any region exceeds the comfort zone limits for a particular class of work, due allocance being made for acclimatization effects, we should be able to predict the general activity level of the population. Furthermore, if we know on how many days the effective temperature is above the critical comfort mark, we could also indicate what types of work will be least well performed--and what types may be precluded. The work level possible during the worst months will affect ability during other months.

25. Another effect can be postulated. If work continues at too high a level, despite the discomfort which results from it, a disproportionate amount of fatigue will result. For action against effective resistance and at high psysiological cost always causes fatigue. A person of high morale and good constitution can withstand such stress for a considerable period without adverse effe but those who attempt to maintain an adequate standard with less favourable endowment may soon experience the fatigue symptoms.

APPENDIX

EXAMPLES OF CURRENT WORK BY DOXIADIS ASSOCIATES

THE FUTURE OF AMARA

Project QGHP 64

A long term program and a master plan for

the development of the city and its region

Summary of the preliminary Report (Document DOX-QA 79, 9-9-58) issued to initiate discussions for the future of Amara with the Government of the Republic of Iraq Development Board and Ministry of Development - Technical Section 5.

D.M.O.P

The future of Amara, Iraq, 1958.
711.434 (56)

Introduction

1. The Development Board of Iraq included Amara among those towns and cities for which Master Plans were to be made as a preparation to proceeding with new large-scale housing projects.

2. The following is a digest of the preliminary report on the long term program and Master Plan for Amara. The preparation of a further interim report, including detailed programs and plans, is in hand for submission to the Development Board after the general principles outlined in the preliminary report have been considered and approved.

3. Amara is a city of around 53,000 people, lying on the river Tigris which connects it with Baghdad, 390 km to the north, and Basrah, 184 km to the south. A highway follows the line of the river but no railroad passes near Amara.

4. Amara is the capital town of Amara liwa and also the administrative center of Amara qadha and nahiya. It lies in flat country like all the districts of Southern Iraq. Most of the soil of the city is saline to a high degree. The soils are recent stratefied materials deposited by the Tigris river. Most of the liwa's area is uninhabited, and almost all ekistic development appears in the Southern part. A minor string of development exists along the shores of the Tigris river to the North of Amara.

5. Extreme temperatures prevail in Amara, high during summer and below freezing point occasionally during winter. The relative humidity is high. The rainy period extends from November to May. Maximum rainfall is noticed in March. It never snows in the town and hail is rarely noticed. Prevailing winds blow from North-Western directions.

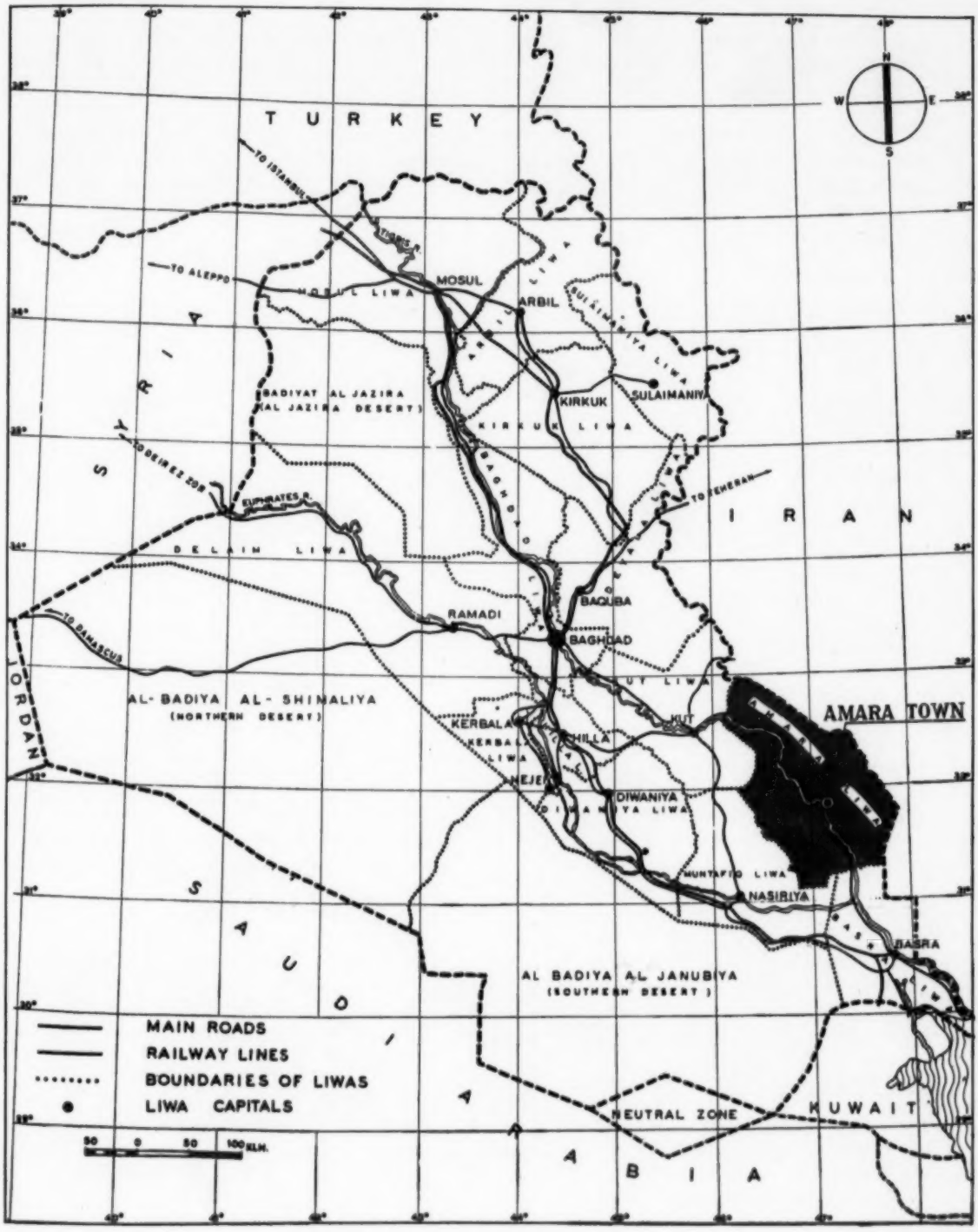
6. The city of Amara is only about one century old. Mohammed Pasha el-Diyarbekerly chose part of the area located between the Tigris and Kahla rivers, which was then known as "Ordu" from the Turkish word for army, as a permanent H.Q. for his military expeditions. He then built a market, known to this day as the "El-Pasha market", and a few houses. As a result, many people emigrated to and settled in this district and named it "Imarah", or Amara, in reference to the buildings and edifices which had been constructed in it. (The Arabic work "Imarah" means building).

7. Amara gradually became the commercial center of its surrounding area and is now one of the ten biggest towns of the country. A map shows schematically the stages of development throughout various periods of time.

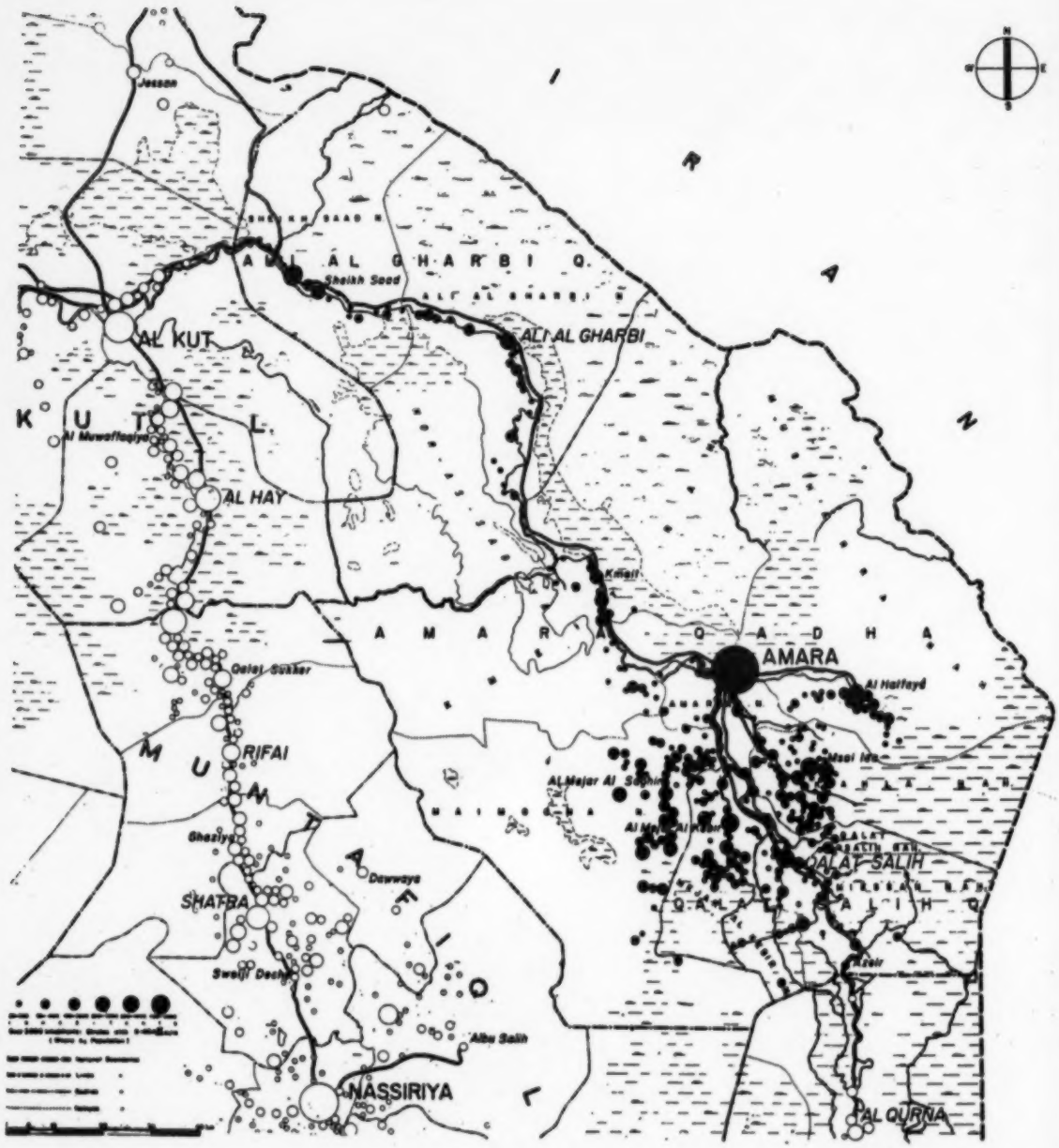
THE PROBLEMS

8. The oustanding problem of Amara is the comparatively primitive housing of its population which can be closely related to its low standards of public health.

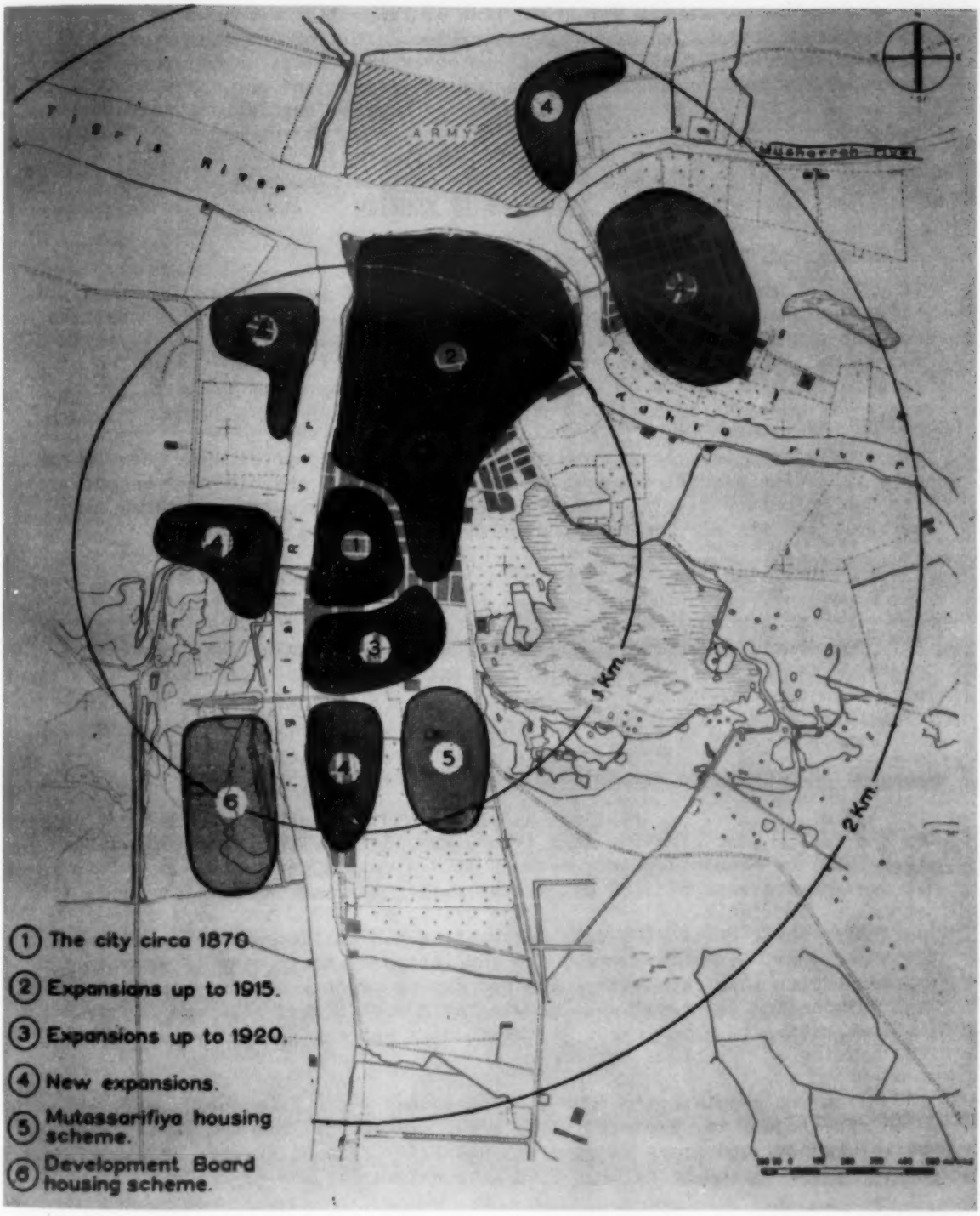
LOCATION OF AMARA



EKISTIC PATTERN OF AMARA LIWA



THE GROWTH OF AMARA



The future of Amara, Iraq, 1958 --2

9. Amara is not in the immediate line of industrial development in Iraq. It is comparatively isolated, communications are poor and its natural resources are not exceptional. On the other hand it is an important river port for the import and export trade of its region and, as one of the two major urban centers along the Tigris river between Baghdad and Basra, it holds an important significance for navigation on the river.

PROBLEMS OF HOUSING

Housing location and density

10. The oldest part of Amara lies on a tongue of land bounded by the Tigris river and one of its tributaries, the Khala river. Its growth is limited towards the S and SE by date plantations and marshes. There is no regularity regarding the road pattern, the size of city-blocks or the orientation of same in the older parts of the city, but a tendency towards the gridirion system is apparent in its Southern newer expansions.

11. During the last twenty years a low income residential area, developed on a radiating street pattern, has grown up east of the old town between the two tributary rivers of Khala and Musharrah. This area contains many sarifas, and its northern parts are covered with date plantations.

12. North of the Tigris and Musharrah rivers there are a number of sarifas but no other forms of housing.

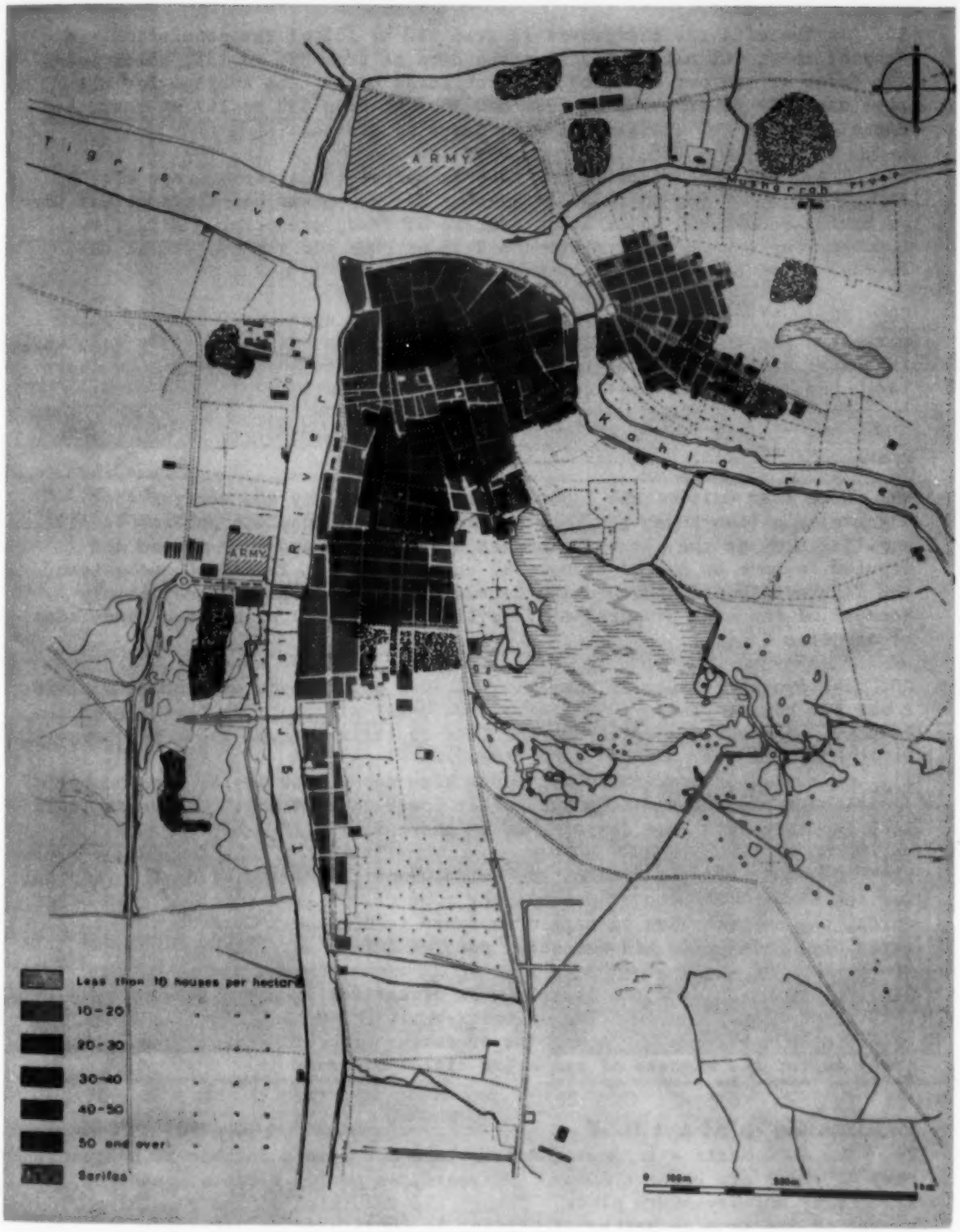
13. The densities of the city are generally low. The average density of the old city is about 29 houses per hectare. The relatively higher densities, with more than 50 houses per hectare, are found only in a few blocks of the central city around the suks.

Population growth and composition

14. At the time of the 1947 census, Amara had a population of 36,907, while, in the census year of 1957, this figure was 53,311. Thus, for the decade 1947-1957 the population increased by 16,404 people, or by 44.45%. This gives an average increase of 3.8% per year. During the same decade, the population of Amara liwa increased to 329,647 by 22,626 or 7.40%, i.e. at a rate of 0.7% per year, while during the same period Iraq had an increase of 35.75% or 3.0% per year. In other words, the population of Amara city is growing rather faster than the average for the entire country but the population of the surrounding countryside is growing at a much slower pace due to considerable migration to other parts of the country which will be discussed under the heading of "problems related to economic prosperity."

15. Both the population pyramids of Amara and Amara Liwa show a very marked drop after the first 9 years. This group numbers 31% and 38% respectively while the next age group is only 18% and 13%. This difference is almost entirely due to the mortality of infants before the end of their first year of life.

NUMBER OF RESIDENTIAL PLOTS PER HECTARE



The future of Amara, Iraq, 1958 --3

16. In the city the difference is from 31% to 18% of the population - a drop of about 40% but in the liwa the drop is from 38% to 13%, which means the death of two out of every three children born. The average for all liwa capitals is from 30% to 20% and for all Iraq 35% to 16% so that, by either comparison, the situation in Amara is serious.

17. This heavy infant mortality rate is reflected in the average size of families. According to the 1956 Housing Census, Amara had the smallest size of family of all the major urban centers of Iraq, excepting Arbil, i.e. 5.53 persons per family. Arbil had 5.35 persons per family, whilst the average ratio for Amara liwa was 6.03.

18. The fall off of male population between the ages of 20 and 29, which is marked in the age pyramids for Amara city and liwa and the country as a whole, is a sign of the recent migration of young males to the large cities (particularly Baghdad and Basrah) and even out of the country.

Housing types, size and structurel conditions

19. More than half of the 7,386 houses in Amara city are sarifas (54%) where people live under the most primitive conditions, without any facilities at all. Many of the permanent houses are very old and some indeed are reputed to have an age of between 80 and 100 years. Indeed an analysis of the figures given in the Housing Census of 1956 show that Amara, mainly because of its high proportion of sarifas, has the worst housing conditions of any liwa capital.

20. The overall number of rooms was 14,466, which gives an average of 1.96 rooms per house. This is the lowest ratio for all the liwa capitals of the country. The average ratio for the liwa capitals is 2.67 rooms per house.

21. On the other hand this small unit size means that the average number of families living in each house is rather lower than most other liwa capitals - 1.08 families per house compared to an average of 1.19.

22. However the small size of the units means that Amara holds the record for the highest density of persons per room of all liwa capitals. In other words, the overcrowding situation in Amara is very serious and, almost certainly, related to its excessive rate of infant mortality.

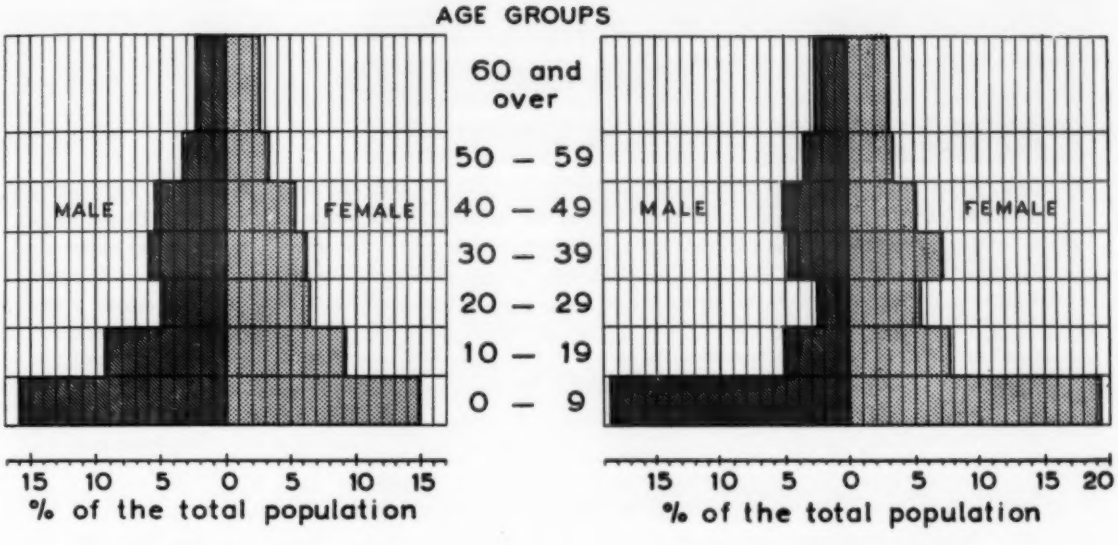
23. Following on from the large number of sarifas in Amara it is not surprising that the proportion of brick-built houses is low - 39% - and exceedingly few (some 2%) are built of earth. The proportion of sarifas (54%) is far the highest of all major cities of Iraq.

Conclusions

24. The 4000 sarifas in Amara need replacement plus a further 1000 houses, many of which are between 80 and 100 years, on narrow streets, dead-end streets or on very small plots. Though the condition of the remaining 2400 houses of the town is better, it cannot be considered as satisfactory,

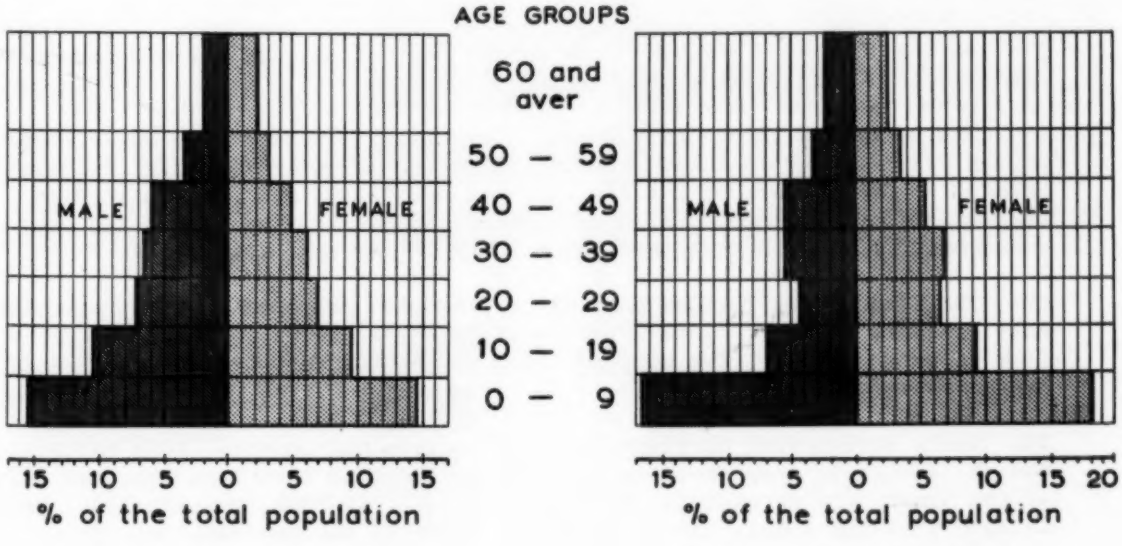
DISTRIBUTION OF THE POPULATION BY AGE AND SEX

POPULATION CENSUS 1947



AMARA TOWN

AMARA LIWA



LIWA CAPITALS AVERAGE

IRAQ AVERAGE

because most of these houses need both improvement of sanitary installations and community facilities. Amelioration, therefore, of these houses is needed.

PROBLEMS OF PUBLIC HEALTH

Incidence of diseases

25. The unhealthy living conditions, the poor food and the hot, wet climate undermine the health of the people, resulting in anaemia which often leads to tuberculosis. Furthermore, the existence of marshes near the town and the bad sewerage system, adversely affect the sanitary conditions of the town. Trachoma claims many victims. In 1952, 1953, 1954 there were respectively, in the liwa, 25,960, 25,471, 23,443 cases, whereas malaria cases during the same years were 6,180, 8.028, 3,450. The flat-worm parasite of bilharzia, which is mainly found in stagnant waters, such as marshes or channels, attack people who bathe in them. In 1952, 1953, 1954 there were correspondingly, 1,450, 1,894, 2,102 cases of bilharzia in the liwa.

Water supply and sanitary conditions

26. The percentage of houses which had piped water laid on was 27.75%, the lowest figure for any liwa capital. This was due to the large number of sarifas. The majority of houses, 72.13% had no connection with the water supply system and their occupants depended for their domestic water requirements upon direct supply from the river. Just over one fifth of the houses, to be exact 21.95%, were connected with electric power. Again the percentage is the lowest amongst all capitals of the liwas.

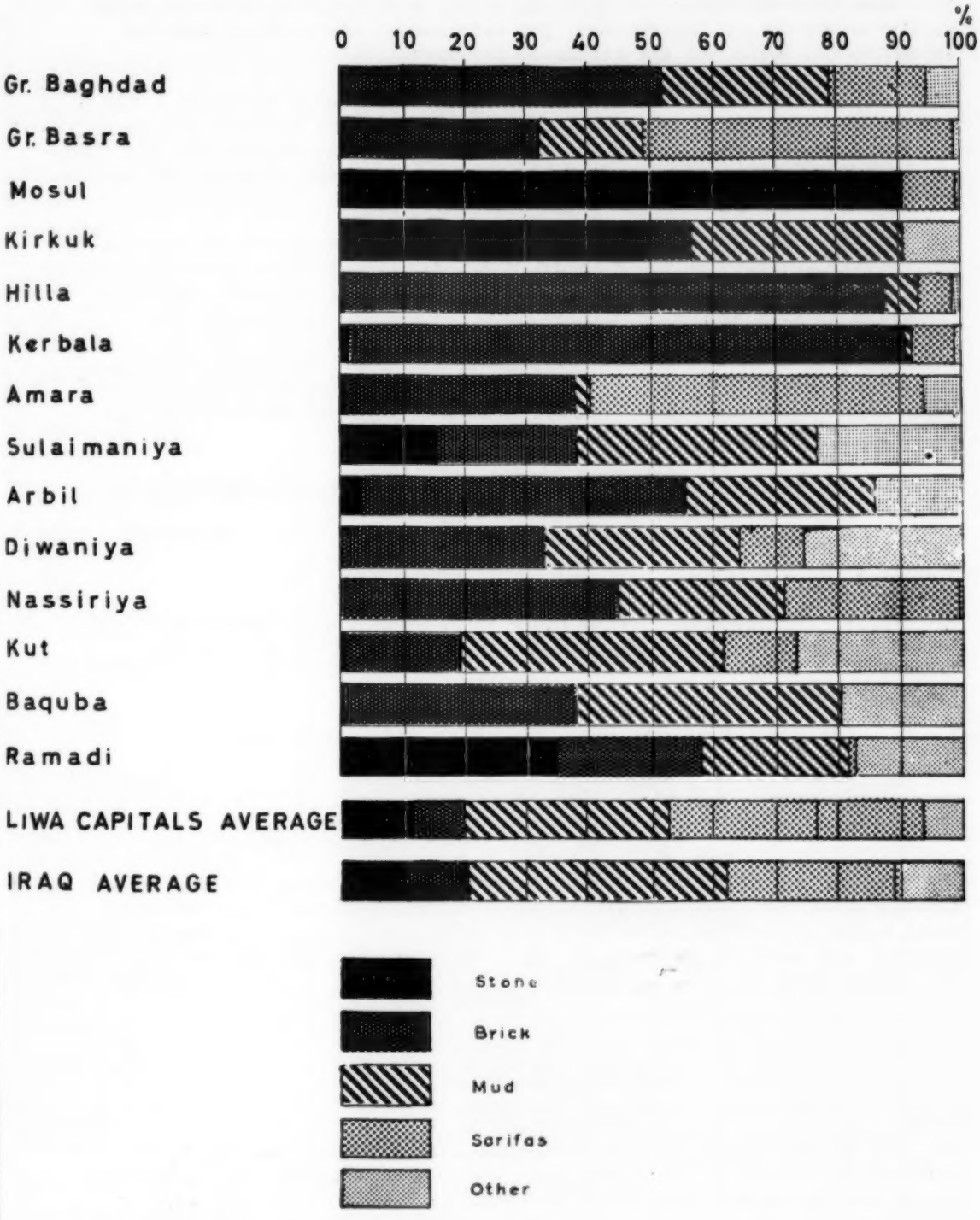
27. During 1956 only 44.07% of the houses had toilets, of one kind or another and only 14.54% had bath facilities.

28. The Water and Electricity Board of Amara takes care of the water supply of the city. Water is taken from the Tigris. The water installations are located in the NW part of the old city and consist of the pumping station, the sedimentation tanks, the chlorination and purification plants and one water tower. There is a second water tower in the Majidiya quarter.

29. The water installations pump daily 1,600,000 gallons of water, operating only 21 hours per day. This water is all consumed or wasted because of lack of water meters. The city for four hours each day, during afternoons, has no water at all.

30. Daily consumption corresponds to 30 gallons per capita.. This ratio, though, should be considered in relation to the fact that less than one third of the houses are connected. Although the ratio is high, nevertheless, waste is such that the supply hardly meets the needs of the consumption. The families living in over 70% of the houses, sarifas included, cover their domestic water requirements directly from the river.

CLASSIFICATION OF HOUSES ACCORDING TO BUILDING MATERIALS USED



31. Less than one-third of the total houses are connected with the water supply network. Its improvement, the increase of its capacity and its expansion, to serve all the citizens, is imperative.

32. Only on the Northern part of the old city is served by sewers. There are two networks, both of combined system, that is for sanitary sewage and storm water. Both are inefficient. The Southern parts of the old city, the Majidiya quarter and the districts lying on the West bank of the Tigris, have no sewers at all.

33. Out of the two networks in the old city, the one is old and consists of brick-built sewers. It is dilapidated and usually blocked. The other, which covers the Northernmost part of the city, consists of concrete pipes of diameters ranging between 6"-21".

34. There is no sewage treatment plant of any type. Sewage is directly discharged through open canals, into the marshes, lying SE of the old city, where also the industrial wastes are disposed of. When the level of the marshes rises the sewers overflow and cause floods.

35. The whole system should be considered as useless. Furthermore, it definitely affects the health conditions in the city.

Hospitals and Clinics

36. There are four hospitals in Amara city, three run by the Ministry of Health and one run by the American Mission. In addition to them six dispensaries operate in the city. By type and number of beds the hospitals are as follows:

General hospital		100 beds
Hospital for chest diseases		52 "
Hospital for child protection		50
General hospital, American Mission		36
	Total	238 beds

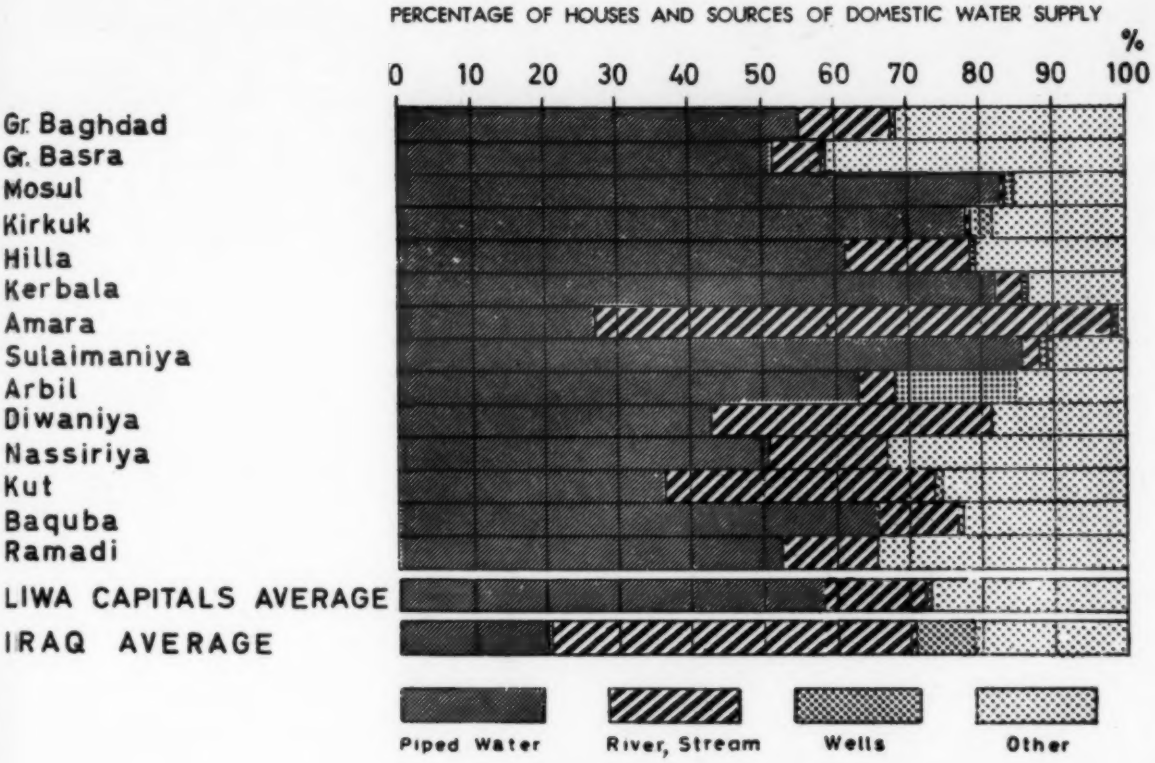
37. The proportion of beds to 1000 people is 4.5 of which 2.6 are for general cases, 1.0 is for chest diseases and 0.9 for child protection. The very small number of beds per 1000 people will soon be improved. A new general hospital for Amara is included in the Development Program and its construction will begin soon.

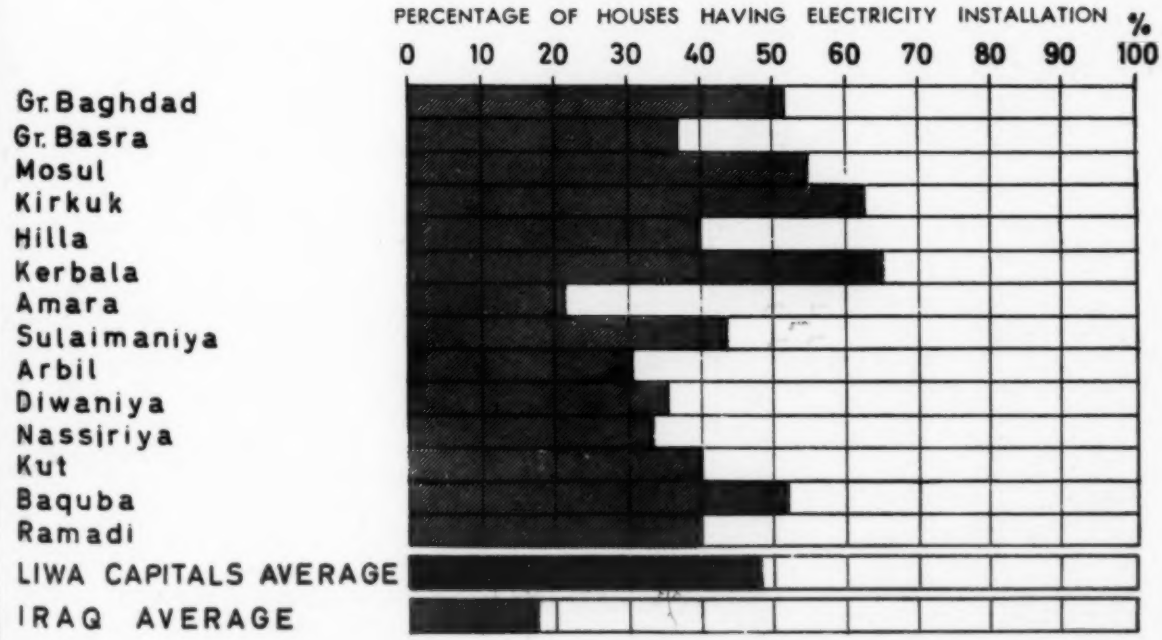
PROBLEMS OF COMMUNICATIONS

Roads

38. The Baghdad-Basra highway which passes through the town is of the greatest importance to its prosperity. The reconstruction and realignment of the way has almost been completed, but the major part of the Amara - Baghdad section is earth road and almost impassable by vehicles during the rainy seasons. The reconstruction of this section is provided for by the

WATER SUPPLY AND ELECTRICITY





development program and construction is under way in the part from Baghdad to Kut.

39. Apart from this highway, the town is connected with the other major settlements of the liwa by three main earth roads running along the banks of the Tigris, Kahla and Musharrah rivers. Branches of these roads lead to the marsh areas and the remaining villages of the liwa.

40. In general the conditions of the streets in Amara are bad. In the old city most of the streets are narrow, irregular and unpaved; quite a few are dead-end. In the Southern parts of the old city, though streets are more regular and follow more or less a gridiron system, still their pavement conditions is the same. In the Majidiya quarter the radiating pattern has wider, but again unpaved streets, without any provision, even elementary, for drainage or sidewalks.

41. Three steel bridges, linking the banks of the three rivers, connect the city with the highways to Baghdad and Basrah. The bridge on the Tigris has just been constructed to replace an old floating bridge. The narrow widths of the bridges over Kahla and Musharrah rivers cause difficulties in the traffic. Furthermore, when these bridges are opened, to allow boats to pass through congestion appears on their approaches.

River Navigation

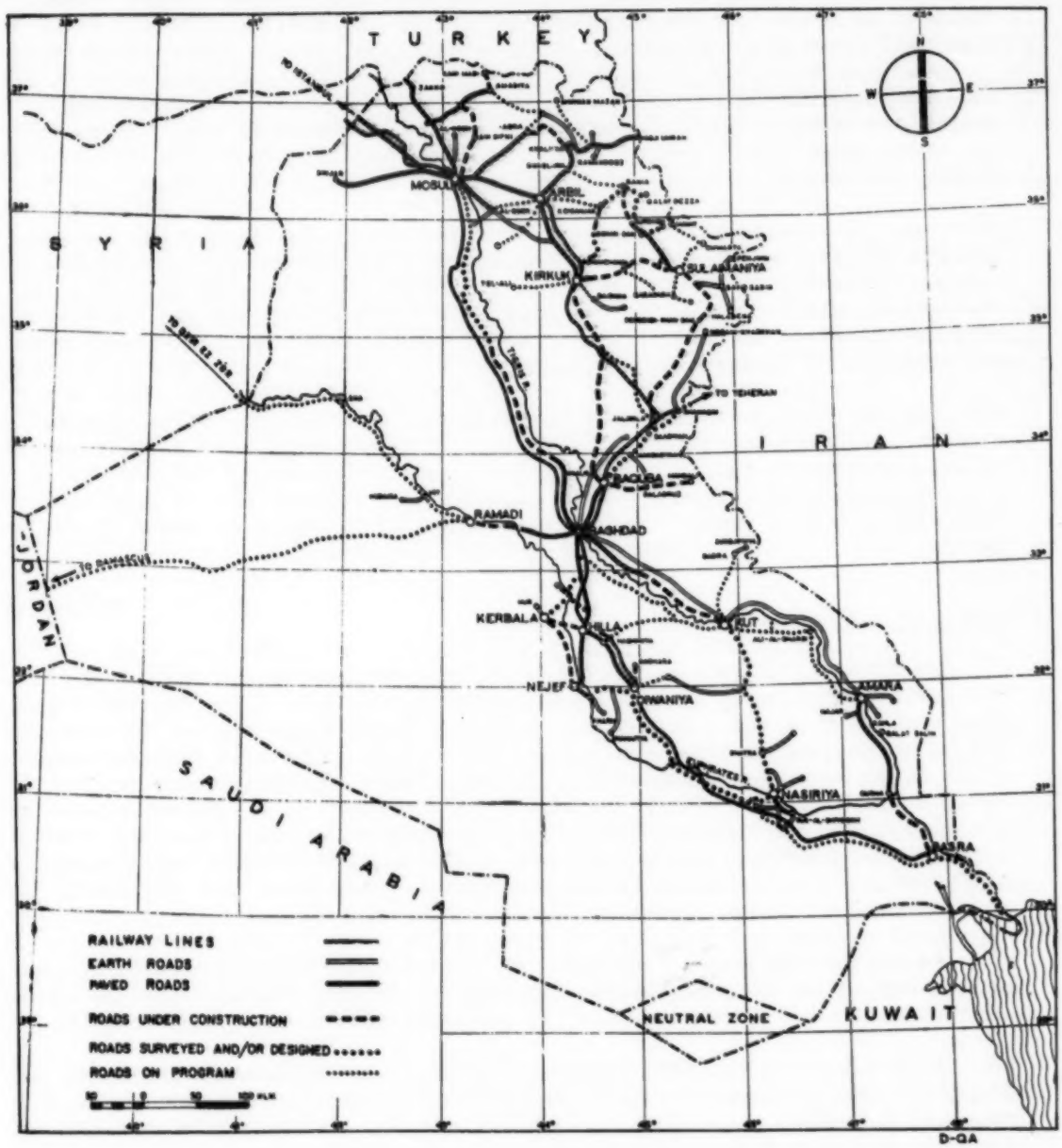
42. There are no port facilities or goods-sheds. Boats dock along the Eastern Bank of the Tigris river, over an area between the bridge and a point about 1-1.5 km North. The loading and unloading of barges is carried out along the river street of the left bank of the Tigris, blocking about one kilometre of the river frontage of the old city. A more suitable place along the same bank should be allocated for these activities in connection with the provision of docking and warehouse facilities.

PROBLEMS OF ECONOMIC PROSPERITY

Agriculture

43. in 1947, 8.3% of the total work force of Amara town was actually engaged in primary production. The liwa itself is very largely agricultural with 74% of its population living in rural areas. Out of its total area of 7.4 million mesharas, only 3.3 million were farmed, the remainder being lakes, marshes and water-logged waste lands. According to the agricultural census of 1952-53 the average size of each holding was 6,884 mesharas, being the maximum in Iraq. In Kut liwa, which had the next highest average, it was 1,087 mesharas, while for the country as a whole this average was only 204 mesharas.

EXISTING AND SCHEDULED ROADS IN IRAQ



the future of Amara, Iraq, 1958 --7

44. The main crops grown in the liwa are barley, wheat and rice. 11% of Iraq's barley production is produced in Amara liwa, and 30% of the total rice cultivations lie in it. Reeds grow in great abundance in the marsh areas and are utilized as raw material for many purposes. Sheep raising and horse-breeding is important throughout the liwa. Considerable numbers of water buffaloe are also to be found in the marsh areas. Game - wild boar and gazelle are abundant. Fish is plentiful in the lakes and marshes.

45. Small rivers in certain parts of the liwa continually change their course and occasionally vary in volume because of the shifting nature of the marsh areas. This fact and the seasonal floods in low-lying areas necessitate the removal of small villages from one district to another.

46. The tie between the farmworker and the land he cultivates has been very weak, because the system of agriculture was based on landlordship. The farmworker cultivated land which he did not own, in return for a certain percentage of the harvest yield. Very often he moved off to another landlord, in the hope of finding better conditions, or he was obliged by the landlord to move, in accordance with the needs of the latter.

47. The increasing facilities in the major urban centers, the absence of similar provision for the rural areas and the popularity of the modern means of communications, radio, cars, telephone, etc., are making the farmer increasingly dissatisfied with his conditions, prompting him to move to a permanent settlement where he can enjoy comparative security and a fixed income.

Industry and Commerce

48. In 1947, 2,223 persons, 2,987 males and 336 females, or 32.54% of the total work force, were engaged in secondary production. The 1954 industrial census shows that there were 1,363 industrial establishments in the liwa, out of which grain milling was the most important industry. In the city, there is an important brick-making industry, with a daily production of about 360,000 bricks. There are also several grain mills. Other industries are almost entirely represented by small workshops in which the owner himself works with traditional equipment. Especially notable among the small master craftsmen are the silversmiths and goldsmiths. There are also many home industries for various crafts, such as woollen rug and mat making.

49. Except for the brick factories, or the small brick kilns and the power station which are at some distance from the city, all other industrial establishments are located within the residential and commercial areas.

50. At the time of the 1956 census of distribution there were 746 shops in the city, or 14.4 shops per 1000 people of the total population. The number of persons engaged was 1,054, or 20.4 persons per 1000 people of the total population. Out of these there were only 45 women, or 4.3% of the total number of people, engaged in the shops. The total wages paid out for the year to shop assistants amounted to ID 30,000* but it must be borne in mind that the shops are nearly all run by the owners themselves who depend on

*1 ID = $2.80

profits for their incomes. Many of them are assisted by members of their families who are not paid wages. The average number of persons working in a shop is as low as 1.4, which clearly shows the preponderance of one-man shops. Annual sales amounted to ID 2,106,493, and this gives an average of ID 2,824 per shop per year. It is equivalent to something of the order of ID 48 of sales per head of the population per year.

51. At the time of the 1957 census of services and service industries the city had 286 establishments, or 5.5 establishments per 1000 people of the total population. The number of persons engaged in these was 842 or 16.3 persons per 1000 people of the total population. The annual wages and salaries per establishment was ID 287, while the annual income per establishment was ID 653.

52. The main civic and commercial establishments are located in the old city. Most of the shops and workshops are concentrated in the suks, i.e., the central market, and in the area adjacent to them. A secondary shopping center has developed in the districts on the right bank of the Tigris river. Apart from these two centers, there are numerous shops along the main streets of the city, while isolated ones may be found also in minor streets. In addition there are several open air markets, where country folk, mainly women, sell mostly foodstuffs.

PROBLEM OF COMMUNITY EQUIPEMNT

Education

53. At the time of the 1947 census, the proportion of literate people was 21.22% of the total population over five years old, while the liwa capitals average for same was 25.86%. Of the literate people, literate women represented a quarter only. Illiteracy was even greater in the liwa. Literate people numbered only 6.35% of the total population over five years of age, whilst the average for the whole of the country was 10.94%.

54. In Amara city somewhat less than one-quarter of the total population is daily occupied with education of some form or another. In 1957 there were 11,594 pupils, 8,931 boys and 2,543 girls, attending 20 primary and 5 secondary schools. In addition there were 274 males attending primary night classes, 61 males attending education courses and 270 males and 112 females attending the two teachers' training schools. If allowance is made for teachers, 210 males and 108 females, it will be seen that education involves 12,629 persons or 23.6% of the total population.

55. In 1951, Amara city had 21 primary schools, including one for night classes, 5 secondary schools, one school for education courses and one for the training of teachers. With the exception of one private secondary school, all other were run by the Government. Most of them were housed in special buildings. However seven public schools were conducted in private rented houses. Two new schools were under construction and another two under study.

The future of Amara, Iraq, 1958 --9

56. The Public Library constitutes the only other worth mentioning cultural establishment. In 1957 it contained 6.453 books and served 25,466 readers. A new library is to be built and an amount of ID 12,000 has already been approved by the Government, as initial allocation for this purpose.

Administration

57. Both the Muttassarifiya and the Municipality are badly accommodated in old buildings. A new special building for the former is under construction. The Post Office has its own new building. Generally speaking the town needs a new civic centre where all administrative and other civic activities will be carried out.

Religion

58. There are two mosques and two churches in Amara. They are all located in the central area of the old city.

Recreation

59. With the exception of the two clubs for civil servants and army officers there are no other significant social activity buildings in Amara. The lack of Social community centers for the general public is apparent.

60. Generally speaking, there are no parks or open spaces in the residential areas of the city. Only one small public park exists, running along the Eastern bank of the Tigris, between the river and the main street. However, a zone of varying widths near the river banks is covered by date plantations which, with the rivers, form the landscape of the city, while the rest of the land around it is barren, except for the swampy area to the South-East.

61. There is only one sportsground in the town, located on the Eastern edge of Majidiya quarter. There is no swimming pool. The people swim in the river, the marshes or the channels, thus being continually exposed to the risk of bilharzia. A relatively clear place in the river has been chosen, where pupils swim under the supervision of their teachers and the school physician. It has been decided by the Ministry of Education to construct a swimming pool in the Majidiya quarter, on an area of 6,000 sq.m.

The future of Amara, Iraq, 1958 --10

THE POLICIES

Future Functions

62. Amara is the major commercial center of a vast agricultural area, Amara liwa, 18,377 sq.km. populated with about 310,000 people. Situated as it is at the crossing point of the Tigris, Kahla and Musharrah rivers, along which the main roads of its wider region run, it holds a key-position from the point of view of the communications within the latter. It further constitutes the highest order administrative center of the liwa.

63. The above will continue to constitute the two main functions of the city also in the future, and will reason the city's development. In addition to them, more functions will develop. The size of its agricultural area and the latter's considerable production justify the establishment in the city of several industries processing agricultural products. The abundance of good quality fish on the other hand, may lead to the development of some fish industries.

Future Population

64. In accordance with the official figures of 1947 and 1957 censuses, the population of Amara has been increasing during the last decade at an average annual rate of 3.8%. This may be due to quite a high extent to inaccuracies of the 1947 census. To be on the safe side, calculations for the future size of Amara's population are based on an average rate of increase of 3.5% per year.

65. In accordance with this rate, doubling of the city's population may be anticipated to occur within 20-25 years. It is of course difficult to predict the exact time needed for it, but to have the program safely based, planning should be done for a double population, independently of the exact time of the realization of the figure.

Physical Development

66. Two factors will influence the future expansion of the city and will direct it towards certain directions; the availability and suitability of big tracts of land and the new highway linking Baghdad with Basra.

67. The lands lying South and Southeast of the present city, are covered with swamps. Although filling of same has started, only minor expansions of the city should be expected towards those directions. However, the lands lying West of the Tigris are very suitable for development. Here there are no swamps or unhealthy areas and most of the lands belong to the Government. The development of this part of Amara is already under way. The housing scheme of the Development Board, that of the Municipality, the new General Hospital of the city and the programmed Baghdad - Amara - Basra highway, all lie to the West and will seriously influence the future expansions of Amara.

The future of Amara, Iraq, 1958 --11

68. From the study of the existing conditions, it becomes apparent that nearly all houses of the city need either replacement or amelioration. It is, therefore, advisable to base all calculations for the future of Amara on the needs of a double population, i.e., 110,000 inhabitants, or, assuming that the future family will consist of 5 persons, instead of 5.5, which is the present composition, on the needs of 22,000 families or houses.

Financial Considerations

69. At present 56.6% of the families of Amara city have an annual income less than ID 250. The average annual income for these families is ID 136, or about ID 11.5 per month. About 25% of the families have annual incomes ranging between ID 250 and ID 450, and the average for these families is ID 325 per year or ID 27 per month. The average annual family income for the remaining families is about ID 1,050.

70. This distribution of the families according to incomes achieved will improve in the future, because of the fast development of the country. It is estimated that during recent years the per capita income in Iraq was increasing at an average annual rate of 5.5% not considering the income deriving from oil. Even if calculations for the future of Amara are based on a moderate annural rate of increase of 4% over the coming generation, considerable changes in the distribution of families according to incomes should be expected. It is anticipated that after 25 years about 10% of the families will have annual incomes averaging ID 350; 40% of them will have annual incomes averaging ID 550; 30% ID 950, and 20% annual incomes averaging ID 2,000.

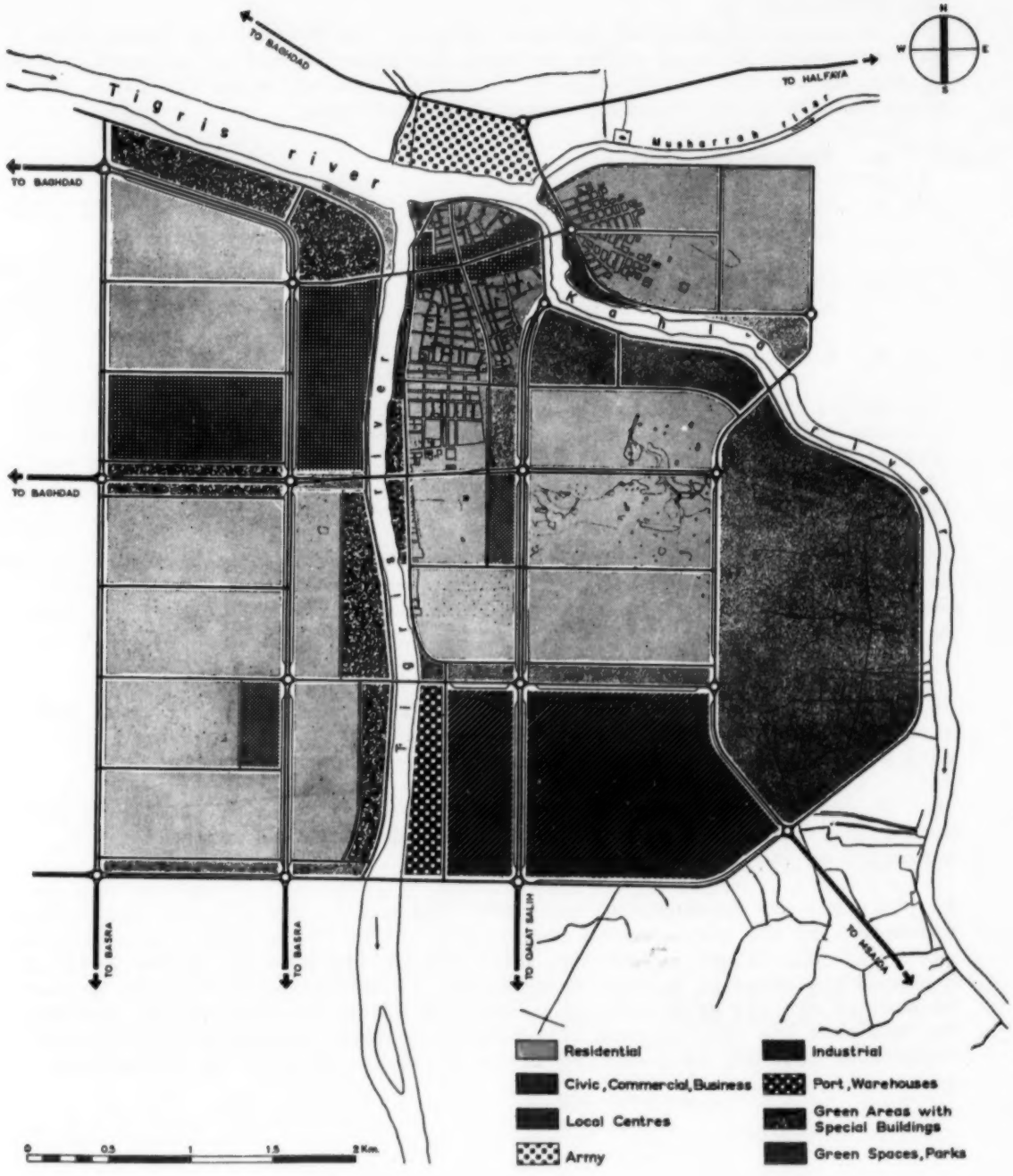
71. On the basic principle that there should be an interrelationship between the family income and the cost, and consequently the size, of the house of each family and on the assumption that residential plots will range between 135 sq.m. and 450 sq.m., the total gross residential area of the future town, that is the total plot area plus allowance for roads, community buildings, local markets etc., will amount to about 900 hectares.

72. On the basis of the estimates regarding the future size of the city its Master Plan may be drawn as a physical expression of the Master Program. To ensure its realization its total cost should be calculated and it should be compared with the anticipated possibilities for the mobilization of public or private resources and checked accordingly.

73. The estimate of the public or private resources, which may become available, is of utmost importance, as the total investment needed for the realization of the plan will be financed by all parties concerned. Thus, projects of national importance will be financed by the Government while projects of local importance will be taken care of by the Local Administration, with or without Government subsidies.

74. Houses, shops, etc., will be financed by private initiative. Nevertheless, to facilitate action, the Government should finance housing projects for the low and middle income families and charge the cost to those concerned with financial facilities. For the lowest-income families the Government should also subsidize housing to a certain extent.

THE PRELIMINARY MASTER PLAN OF AMARA



The future of Amara, Iraq, 1958 --12

THE PROGRAMS

The Master Plan

75. In accordance with the policies set out, the Preliminary Master Plan has been prepared in an effort to solve the existing and anticipated problems. It aims at serving a population of about 110,000 people and its total area is approximately 1,850 hectares, broken down as follows:

a.	Residential areas	900 hectares
b.	Central civic, commercial and business areas	150 "
c.	Industrial zones, port and warehouse facilities	200 "
d.	Parks, cemeteries, major roads	600 "

76. Whilst considerable expansions towards the South and South-West of the old city are anticipated and provided for by the plan, the main expansions have been provided over the areas lying West of the Tigris, where the best lands for development are located (see paras 66 and 67). A limited expansion has been provided in the Majidiya quartor to serve local needs only.

77. As the present central area of Amara is congested, and has no possibility for expansion, a new central area has been provided West of the Tigris to accommodate the main civic, commercial and business activities of the city. An industrial zone has been located in the Southern areas of the old city in connection with port and warehouse facilities.

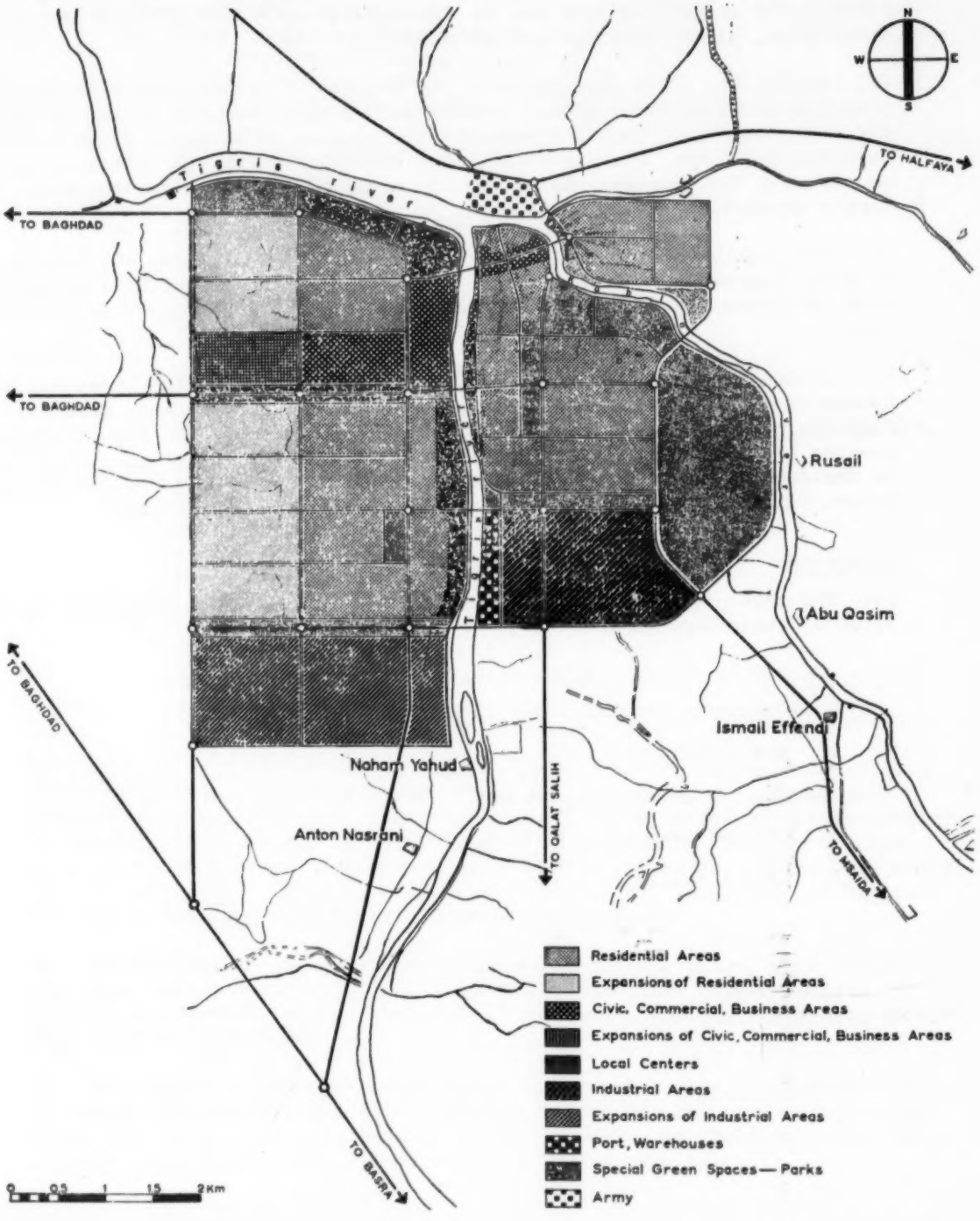
78. Several green spaces have been provided in the residential areas and along the rivers. Considerable areas, which at present are covered with date plantations, have been considered for development as parks.

79. No development of the city in the areas lying North of the Tigris and Musharrah rivers has been provided. These areas will be needed for the expansion of the military installations.

80. All the new developments have been designed in way allowing for further expansions of the city, beyond the targets set by the program, in a functional way. Such additional expansions, which may be found to be necessary during a second big phase of Amara's development, or which may be required earlier because of factors unforeseen at present, will be provided towards the West. In that case the central area will also be expanded Westwards and a second industrial zone may be developed in the Southern parts of the residential areas lying West of the Tigris.

THE PRELIMINARY MASTER PLAN OF AMARA

POSSIBILITIES FOR FURTHER EXPANSIONS



The future of Amara, Iraq, 1958 --13

The First Stage

81. The most urgent needs of Amara are those referring to the housing of about 4,000 sarifa dwellers and to the construction of up-to-date community facilities, mainly sewerage and water supply systems.

82. During the first five years of the program's implementation the maximum possible of these needs should be covered. Urgent measures should be taken for the creation of possibilities for the housing of at least 3,000 sarifa dwelling families. Simultaneously, the commencement of the construction of an entirely new sewerage system and the expansion of the existing water supply network should be undertaken.

83. The problem of the sarifa dwellers can only be solved by the launching of slum clearance projects, through which big tracts of land will be developed with all community facilities and buildings and the foundations of houses laid.

84. In addition to these two types of projects, that is slum clearance and community facilities, a considerable number of houses, to cover needs of families other than sarifa dwellers, should be erected. The amelioration program of existing districts should also commence. Furthermore, a number of residential plots should also be developed in order to guide and attract houses built through private initiative in organized communities.

Financing

85. The approximate estimate of cost for the city's development during the first 25 years amounts to:

a.	New residential communities	ID 28.0 million
b.	Community buildings for (a).	" 4.0 "
c.	Amelioration of 2,400 houses	" 0.6 "
d.	Major community facilities	" 4.4 "
e.	Central area	" 3.0 "
f.	Land acquisition	" 5.0 "
	Total	ID 46.0 million

The future of Amara, Iraq, 1958 --14

86. The cost of the first 5-year program is estimated to amount to:

a. Government initiative			
i. Slum clearance projects for the creation of housing facilities for 3,000 families living in sarifas	ID 0.60 million		
ii. New housing communities for 1000 families	ID 1.25	"	
iii. Development of plots for 750 houses	ID 0.25	"	
iv. Amelioration of the housing conditions of 1,500 families	ID 0.40	"	
v. General community facilities	ID 1.00	"	
vi. Land acquisition	ID 0.50	"	ID 4.00 million
b. Private initiative			
i. Construction of 3,000 small houses by the sarifa dwellers on the plots of (a,i) above	ID 1.00 million		
ii. Construction of 750 houses on the plots of (a,iii) above	ID 1.00	"	ID 2.00 million
Grand Total			ID 6.00 million

87. The sum of ID 4,000,000, which should be allocated through Government funds during the first five years of the implementation of the ekistic program of Amara, requires a considerable effort on behalf of the Government. It should, nevertheless, be borne in mind that Amara is the city of Iraq with the worst housing conditions. Any effort, therefore, of the Government for the improvement of these conditions will be justified, and the bigger the effort the faster the conditions will be improved.

88. The Government, in accordance with its general policies, will define the exact amount which will be allocated for the first 5-year program of Amara's development, and on the basis of these allocations, this program will then be finally drafted.

89. The nature of the problem of Amara is such that it justifies the taking of urgent measures for its quick solution as, otherwise, more and more problems will be accumulated, whether social, economic or technical, and their solution will become more and more difficult and complicated.

E K I S T I C S

HOUSING & PLANNING ABSTRACTS

CLASSIFICATION SYSTEM USED BY DOXIADIS ASSOCIATES

A The Problems

B The Policies

C The Programs

D People, Development, and Ekistics**
- Geographic factors
- Social factors
- Industry
- Agriculture
- Transportation

E Houses

F Structures
(Exclusive of Houses)

G Community services
Utilities and Social Services

H Regions

I Major urban centers

J Market towns
- Medium-sized and small towns
- New towns

K Villages
- Rural land

L Farms

M Surveys
- Census data
- Topographical surveys

N Research
(and Technical Education)

O Planning
(and Landscaping)

P Financing

Q Urban land

R Labor

S Materials

T Construction
- Systems of Building and Costs

U Implementation

V Management

W Administration

X Legislation

**Refers to centers of activities in relation to their surrounding regions.